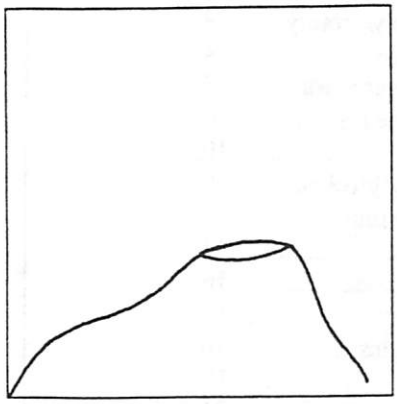
THE NEON NEWS

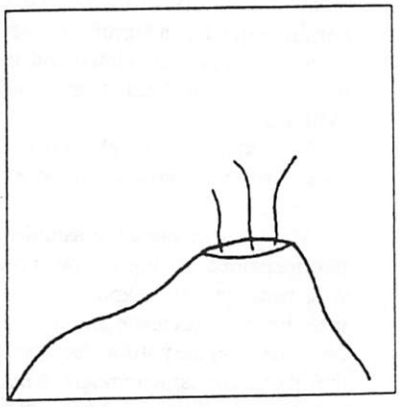
BETTER LATE THAN NEVER

NUMBER 16 September 1994



Cheap animation

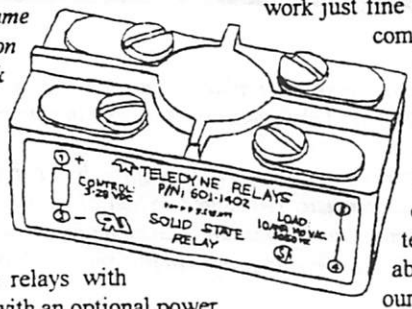
New life for the old IBM



*<**Editor's note**: All things come to those who wait. Years ago I concluded that building a computer-driven animator for neon shouldn't be that difficult, but durned if I had the time or experience to puzzle it out. I even suggested to several people with the wizardly know-how that such a device had marketability, to no avail. Out of the blue came Telford, electronics engineer and home neon hobbyist, to lay it out simple and clear -- thank you!>*

By Telford Dorr

What is presented here is an eight- (or up to 24-) channel, build-it-yourself, computer-operated animator.



To make this device is not so difficult – the hardware involved is simply solid-state-type relays with associated hardware for mounting and wiring, with an optional power source if you don't want to tap into the computer's power source. The connection to the computer is via the parallel printer port.

The software used to run it is simple commands executed in Basic, explained below.

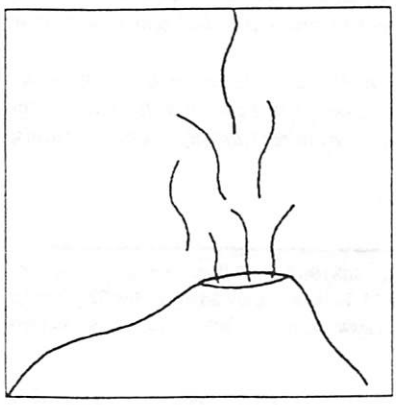
Unlike mechanical-type flashers and chasers usually used in neon work, you can make this unit animate your tubes at virtually any rate, in any order (including completely random), and with virtually unlimited sequence length! And you can change these as you see fit, with only simple program modifications.

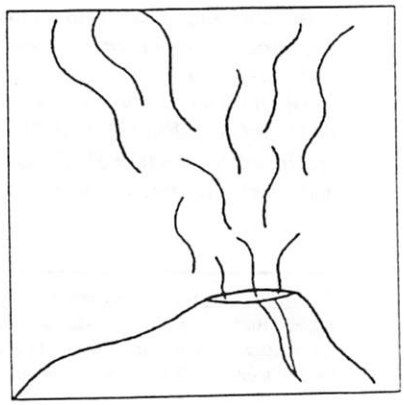
The magic component needed is an old Apple II or IBM compatible PC. You don't need anything fancy here at all! The most anemic, handicapped, monochrome, slow, and memory-poor computer will work just fine for this. All you need to make sure of is (1) that the computer works, (2) that it has a parallel printer port, and (3) that it has the BASIC computer language program available.

You, or someone you know, may even have one of these machines buried deep in a closet somewhere, long ago abandoned because of its lack of capacity and computing power. Because of advances in computer technology over the years, these early machines are just about worthless on the used market, but will work fine for our purposes. You should be able to find someone who will give you one for free, just to get rid of it. If you have to buy a used machine, don't pay too much! Also, be sure to get all the cables, manuals, and documentation that originally came with the machine from the seller.

I am writing this article oriented toward the IBM machines. If you want to use an Apple II computer (not a Mac), the hardware shown here should work fine, although the parallel port

(See Dorr, page 9)





Burnin' rubber & canary-yellow gas

By Michael Blazek

While living in Seattle, I had a customer whose brother-in-law was an installer, and he was putting the finishing touches on some border tubing to highlight the outside of a Seattle bar. (It was more than just coincidence that this brother-in-law did a lot of work for bars). It was late on a Friday night on one of the Seafair Carnival weekends, and this installer was very anxious to get down to the hydroplane pits and begin a long weekend of imbibing.

Perhaps it was this zealous anticipation that explained his rather odd reply when the bar owner came outside to inspect the job. The installer was just putting the stepladder in the back of the pickup truck when the owner noticed dim spots on more than a few tubes. He inquired about the nature of this uneven glow and to a particular phenomenon in one tube where the light seemed to spin around in a thin line or "snake" its way through the end tube. The installer climbed into the driver's seat, started his engine, then leaned his elbow out the open window to explain, "It's either burnin' in or burnin' out, but I'm burnin' rubber!" With that he slipped the truck in gear, dropped the clutch and fishtailed out of the parking lot, leaving behind a cloud of smoke and a pungent rubber smell.

Which gas?

We had a customer about two years ago who is no longer in the neon business. Perhaps this story will shed some light on that situation.

When shown our color samples for matching a neon sign to the interior paint color, this customer picked out bromo blue coated filled with neon gas. We explained that this particular manufacturer's tube, when it was made into lettering, exhibited a different powder consistency in the portion that was bent as opposed to the portions of the tube that remained straight. A noticeable lightening and darkening resulted, which would be more noticeable with neon gas inside the tube. "Oh, no! That is the exact color, nothing else even comes close. Just go ahead."

Sure enough, when the job was installed, the customer had a cow. The salesperson called to ask what we could we do about it. "Could you straighten out the tubing and use it on another job?"

Nope.

I suggested that we could repump the tubing using blue gas instead of red gas.

"What color would that give us?"

A low-intensity, medium blue.

There was a short pause on the line. I could imagine this person trying to visualize blue in the present color scheme. Then the voice returned:

"No, I don't think that is going to work. What color would we get if you put canary yellow gas in the tubing?" ♦

Table of contents

Neon history..... 3
Three-year warranty..... 4
The Bell Jar..... 4
Meter misses mark..... 5
Beautiful beads..... 6
Suppliers..... 10
Water-base blockout.....10
Bolton column..... 12
Install tips..... 14
Buyer's guide..... 16
News notes..... 17
Shipping glass.....18
Index..... 19
Bulletin board/ads..... 24

Dear Tubeheads,

It's been a neon-filled spring and a sunny summer (good for replacing our tin roof), so Neon News had to wait. Now we have plenty of articles and had better move it on out, since with the first Tubeheads directory and the index of back issues and a few other projects we are awash in print...

We had a rare thrill on July 22: the Palace Theatre neon we restored was officially lit up in a nice little ceremony, complete with a rented searchlight, politicians speechifying and live Hawaiian music. Ted rigged up four bicycles with neon (and the dog wore a green neon collar) to publicize the sign-lighting in Hilo's annual evening "lantern parade" just beforehand. And a few months earlier we went back to Europe; besides visiting neon friends we saw clever neon graphics on wire frames in Budapest and some funny lifts and turns in Prague's neon letter styles.

One sign that this newsletter has reached adulthood is that it has made some enemies, not only critics of our editing but also friends who criticize each other in these pages. In Japan, the matchmaker takes responsibility for the subsequent relationship; but in publishing, we let most views slug it out, with minimal editorial refereeing. So one contributor felt we printed an unfair attack, and another blasted us for declining to print his criticisms of a certain company. We sympathize with both parties, but our policy is to encourage dialogue and eschew libel suits. Okay?

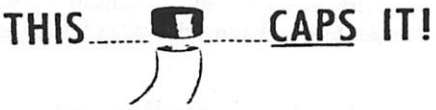
We have lots of stuff for the next issue already, so it shouldn't be too long; maybe Christmas? All you Audie Foote fans will only get your fix then if you SEND FAN LETTERS -- our most faithful contributor is taking time off. Send your ideas on Neon Education for Customers and Install Stories from Hell, and stories about your town's favorite neon for Len Davidson's column, and any other tips, suppliers, questions, and general ranting you want to share.

Val + Ted

The Neon News is published periodically by Ted Pirsig and Val Crawford, P.O. Box 668, Volcano, Hawaii, 96785 USA: (808) 967-7648 (Fax: same). Subscriptions are $20 for four issues U.S.; $22 for Canada and Mexico; $24 foreign, payable in U.S. currency only. Single issues are $5; back issues are $4 each plus $2 per order for postage and handling. Classified ads can be place by subscribers for $.50 per word. The Neon News welcomes stories, artwork, photos, letters, suggestions and any kind of feedback. The newsletter is intended as a forum where neon folks can exchange ideas and information.

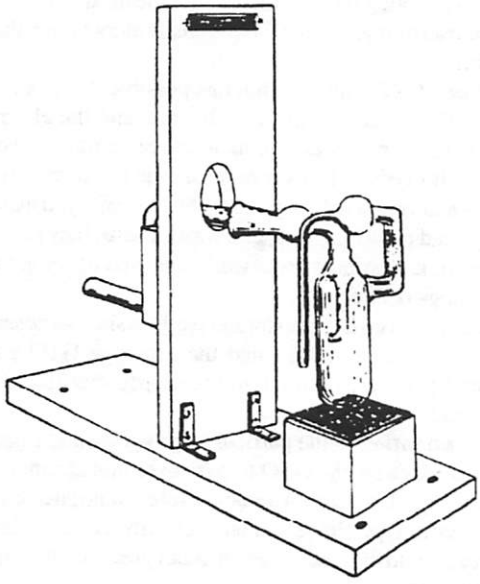
More old and out-of-the-way neon history

*<From a set of old catalogs, data sheets and ads passed our way from **Mark Cherveny**, "mostly obtained from the collection of Mr. G. Kilburn." Comments by Mark.>*



Sylvania tubing as you can see was capped like Tecnolux; this is from the 1950s or before. "It's cap-sealed with plastic...sealed on the outside leaving the inner-coating untouched. Gone are darkened ends caused by cork plugs...gone is the waste of time and tube caused by trimming!"

The following are from the Neon Sign Supply Inc. catalog from Milwaukee in 1940-41



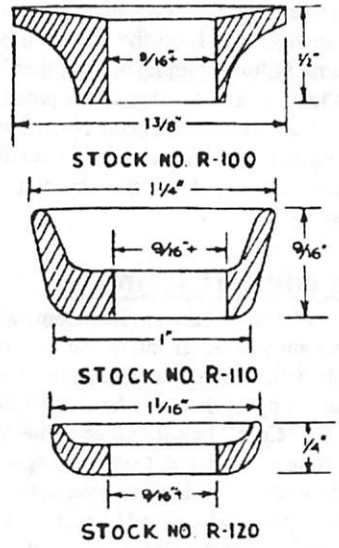
"This is a simplified form of the McLeod gauge. Its purpose is to check the final vacuum of the evacuating system to determine whether the pump is in good operating condition. The need for an accurate gauge for the measurement of very low pressures came about with the introduction of fluorescent tubing. It is especially important that fluorescent tubing be pumped down to a final vacuum of at least 0.5 micron before the gas is admitted. The McLeod gauge indicates when this vacuum has been attained and so if the operator takes an occasional reading he will make sure that the pumping system is in good order. Improperly pumped fluorescent tubing discolors very readily and its useful life is thereby shortened.

"Price including mercury: $15.00"

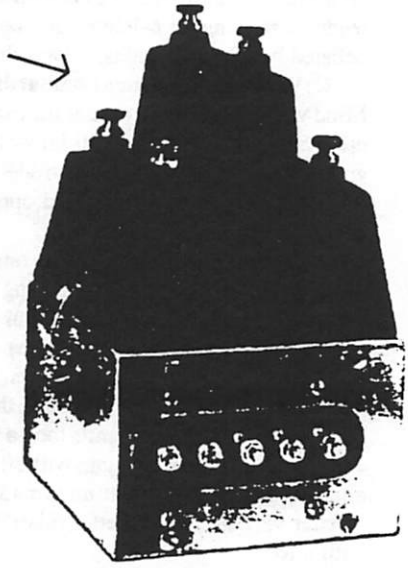
Hot-rod "Ethyl Super-Heat Burner Tips" with cooling fins.

"Lighted neon signs attract bugs which often find their way into the openings in housings and bushings. Accumulations of bugs cause conducting paths between the electrode and sign body with the result that electrodes frequently puncture. A great many tube failures are due to this cause.

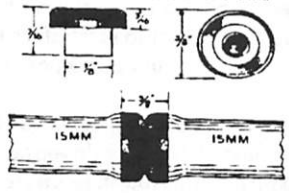
"These live rubber washers will fit practically every housing or bushing on the market and effectively prevent the entrance of bugs and other conducting materials. We suggest that you order an assortment of these washers and be prepared to solve the bug problem wherever it exists."



Flash two tubes alternately with one transformer



"Supro Kapseal Electrodes: The new Kapseal Electrode has been especially designed for fluorescent lighting installations. In appearance the Kapseal is a shallow metal cap with a central shell. When sealed to the ends of the tube a continuous line of light results with only 3/16 inch dark space at each end. The entire length of the tube is evenly lighted. Electrode bends are entirely eliminated."



"Smooth writing effects are made possible by splicing Neo Rite Multigraphic electrodes at regular intervals in the sections of tubing. These electrodes are then connected to the contact points of the Animator."<*See illustration on jump page*>

"When making up any single section of tubing use a 15 mil electrode for first and last positions (A and J in diagram), and 12 mil electrodes at all intermediate points (B through H). Evacuate the tube by normal pumping procedure. Connect the bombarding transformer to

(see Old, page 5)

How to offer a 3-year warranty ...without going broke

By Ted Pirsig

Our way to play the ever-more-competitive market has been to focus on quality, mainly in the way of a three-year warranty (covering general failure, staining or any other "internal" problems). Part of this focus is also to educate the prospective client ("Yes, there are more than six colors in neon; No, it doesn't have to buzz; Yes, here's our past-client reference list; No, we didn't make that flickering pre-stained atrocity down the street"). *<See Buyer's Guide in this issue>.*

To combat staining:

A) **Neon Products (Eurocom) electrodes.** This will no doubt piss some people off, but let me just say that by my experience, tubes made with these do not stain. Not to say that other electrodes cause stain (stepping carefully here), just that these don't.

B) **"Cold" bending technique.** Which isn't to say cold flames; far from it, as I use oxygen to speed up my heating. A "cold" technique is one where, as soon as the glass is up to temperature, you simultaneously bend and blow, then are done. A "hot" technique is where you heat the glass to where it's really soupy first, and perhaps work it awhile. The difference in appearance is quite apparent even on a finished, unlit unit. I'm convinced that the additional heating leads to staining on calcium tungstate colors, though the point is debated by others. Besides, I don't think it looks as nice.

C) **Very hot glass when bombarding** – approaching melt-down. Mind you, this doesn't come at the expense of over-bombarding the electrodes – with a 25- or 30-kilovolt bombarder the glass can be gotten quite hot without the electrodes going more then a dull cherry (at which point the vacuum is dropped to 1/2 torr and the choke turned up, to cherry them good.)

D) **Decent end vacuum,** in the range of 1-2 microns or better (as measured in the manifold, keeping the tubulation between the manifold and the neon unit short). Our sole mechanical pump (Welch 1402) did just fine for the first few years, and none of those tubes have stained out, five years later. But when the pump started getting worn and dropped off a bit (3-4 microns), the argon tubes would snake an hour or two and the neon units took a few minutes to get red end-to-end. Adding a diffusion pump with silicone oil took care of that, and after 1-1/2 years none of the units made with it have stained. And the "better vacuum makes better tubes" purist in me is pretty happy with it too.

E) **Keep units relatively short.** Occasionally I'll get cajoled or tempted into going longer than 8 feet, at which point I do a three-step bombardment (preheat/pumpdown; bomb normal; helium rinse).

F) **Fill units cold.** Sorry, I know hot-filling units has a strong following, but I'd rather be dead-on in my filling pressures. I have yet to see any adverse reaction to this (such as diffusion oil backstreaming); it does take longer to whack through a pile of tubes however.

To make a lasting installation:

A) **No solid-state transformers.** I might check 'em out again in another five years, but I've been thrice burned (three different manufacturers, involving quite a few units) and I don't have time or money to do field testing for the manufacturers. Not when I'm covering it for three years and have to possibly drive all day to change out a transformer.

B) **I use smaller transformers** – maximum 12,000 inside, 9,000 outside. (An added benefit of smaller transformers is little or no buzzing.)

C) **I load to a maximum of 80%** of the transformer short circuit, never over (tempting though it is when it means the difference of an additional transformer or not). No transformers larger than 30 Ma short-circuit, either.

D) **I keep GTO runs as short** as possible. (This can be a real headache, like when you arrive on the site and the electrician has already run in the power according to the blueprint and you have to tell him no, it needs to be over here, and he has to call his boss for approval – and you have to explain to the boss why you need it where you need it and not where it is, and why on earth they put it there on the blueprint, and wonder meanwhile why you never get consulted on these things beforehand...)

Especially, I keep the transformer leads as short as possible, often breaking up a run in middle, and then running GTO end-to-end, perhaps mid-point-grounding it to the transformer lug too, if it's a balanced load.

E) **Pay attention** to the particulars of wiring and installing: No sharp metal edges for the GTO to pass over; transformers mounted against the side of the can (where possible); ventilated cans (I even installed muffin-type blowers in one hot-ceilinged installation); lots of air space around the electrodes (or small pieces of thick mica when that's impossible).

Also, I prefer the new Transco and Actown epoxy-filled transformers – they both allow mid-point grounding on their smaller models, and offer longer warranties than other companies. ♦

Vacuum hackers gather under The Bell Jar

The Bell Jar: The journal of vacuum technique and related topics for the amateur investigator. 35 Windsor Drive, Amherst, NH 03031. Tel: (603) 429-0948; BBS: (603) 424-3501. Published quarterly by Stephen Hansen; subscriptions are $20 (US), $23 (Canada & Mexico), $29 elsewhere.

Reviewed by Ted Pirsig

One of the reasons I stay interested in neon is that it is such a crossroads of disciplines and interests, from art to electronics to hand-eye coordination to vacuum theory, permits and codes and ladders thrown in just for fun.

Vacuum theory is where most tubebenders bog down: after all, you turn the valves and pump the tubes, what more do you need to know? Well, should the bug to learn more hit you, here's a great place to start – and you already have a pump and manifold sitting there waiting.

The Bell Jar is a class act, combining a do-it-yourself-with-scrounged-materials approach, crisp illustrations, clear writing, interesting articles and a format for readers to contribute or ask questions (similar to Neon News).

While the range of the articles is broader than I'll ever use ("A Homebuilt Transmission Electron Microscope," "Build a Multiplate Chamber Beam Source"), there's plenty of interest for a neon shop, such as converting an old room dehumidifier to serve as a diffusion pump cooler; a chart that shows how pumps, gauges and applications relate in terms of degree of vacuum; thermocouple tube calibration; cleaning surfaces for epoxy bonding. and so on. Good stuff! ♦

Meter misses mark

By Don Hood

When our wholesale customer ordered a milliamp meter to calibrate the neon tubes we had made for him, I thought, "Here's someone with an understanding of neon." The meter we supplied is expensive, but so is a CO2 meter in a garage -- and we all expect our cars to be properly tuned when done.

Just to be sure, I had already made a wiring diagram for the tubes -- a normal service to my customers. I knew there could only be a marginal difference between brands of transformers, so I was confident that he'd find the same results as what my diagram showed.

I was in a pretty good mood too -- the sun had been shining for days (normally it's very wet here) -- and when I delivered the meter I gave them a demonstration of how to use it too.

I left feeling that at last, after a lifetime of trying to promote quality, someone was listening. In this regard I generally feel like Don Quixote (or Robin Hood, thus my pen name).

Back in the glass shop I found a telephone message that immediately brought me back to reality. Would I be so kind as to go to the customer (a long drive) and explain why the new meter I had supplied was not indicating accurately?

"How can that be?" I thought. "Newly out of the box, specially made, and I even checked it myself first. I had explained everything, and surely those guys could understand it?" I felt frustrated the rest of the day.

Next day I drove back there and the secretary behind the counter said I could just go directly back -- normally no one is allowed in the workshop without the big chief being warned. In the workshop I saw a test bench with neon tubes connected to a 30 mA transformer. The meter I had supplied was properly connected and reading 24 mA.

Amazed, I asked what was wrong, as the meter was working properly. The workshop foreman says, watch this. He connected two other meters -- one, a home-converted moving-coil type for measuring DC current, and the other one a digital type that comes free with every box of corn flakes. The first meter showed a reading too low, and the digital meter gave a reading too high. "See what I mean," says the foreman to me, "my meters show 21 mA and 27 mA respectively, and that's correct!"

Naively thinking the guy was joking I asked which meter was right. Full of conviction he answered "Both are right."

I hardly dared ask -- "How is that possible?"

"Well," he answered, a distant look in his eyes, "I'll try to explain it to you but I don't think that a simple glassblower will be able to understand it."

"OOOOOOooh" I said, "try me, you never can tell."

"This is how it works. One meter is directly connected to the transformer and the second meter is connected five tubes further in the circuit."

"Really!" I said. My thoughts began to drift as he explained that the difference in current was "due to the loss of current in the neon tubes, this is logical. The two meters are not connected directly with each other, and that makes the difference in the reading." (MY GOD).

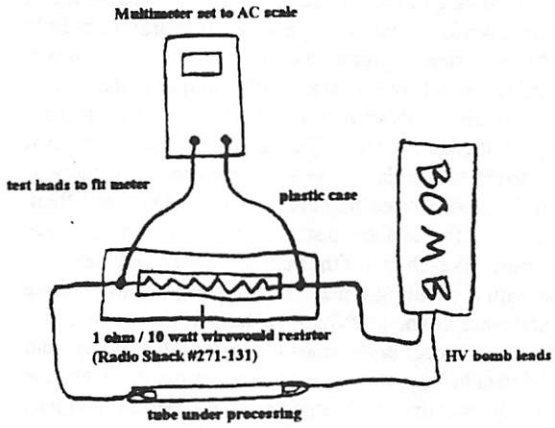
They returned the meter to me and I clearly understood: The boss had bought two meters with the company's money so they must be good, otherwise he was wrong (and bosses are never wrong).

The beautiful blue sky was unable to cheer me up. ♦

Smart circuit serves as ammeter

By Marion Enos

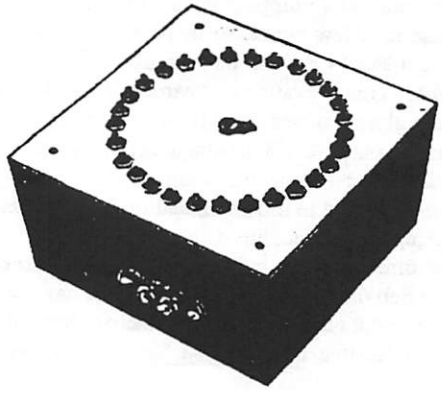
Why purchase a special (read: expensive) ammeter for the bombarding bench when you might already have one and not know it?



With this circuit and a multimeter, reading a bombarding current is a snap.

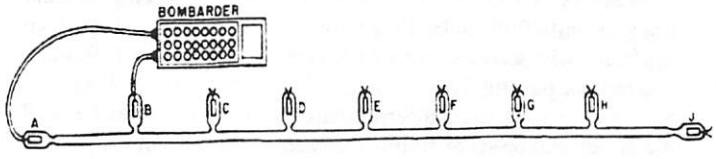
A few words of caution -- this circuit/meter combination and all attached wiring are above ground potential and require isolation. ♦

(Old, from page 3)



electrodes A and B. Heat electrode B to its normal bombarding color. Then connect the bombarding transformer to electrodes C and D until they are properly heated. Repeat the heating process for electrodes E and F, G and H. Now connect the bombarder to the first and last electrodes (A and J). Bombard and pump as with normal tubing. Admit the same amount of gas that is normally required for the type of tubing used."

The Neo Rite animators in practice suffered insulation breakdown between the points and didn't last very long, according to one serviceman I talked with. ♦



Birthing beautiful beads: Ornamental glass, part 2

By Candice King

First, get your stuff together:

Preparing mandrels: Have your mandrels cut to approximately 12" each. I like them long to keep my hands cool, and to allow me to make a lot of seed beads (about 10) on a single mandrel. Mandrels can be either brass or steel. I prefer steel, as brass melts at a lower temperature, and it's easy to overheat and will collapse in the middle of a bead. Brass is also a softer metal and it's hard to keep them perfectly straight with repeated use. The one advantage to brass is it is a little easier to get the beads off, because brass contracts more as it cools. If you do choose brass mandrels, I suggest you roll them between a brick and a flat surface to straighten them after each use. Often there are burrs on each end of the mandrel where they were cut. Remove these with a grinding wheel. Failure to do so will cause beads to chip and crack as you try to remove them from the rod. Since the diameter of the mandrel determines the size of the hole in your bead it is a good idea to have several sizes. Remember to always use the same end of the mandrel each time you make beads. You may want to mark or put a piece of tape on the side you use as a handle to avoid confusion.

Preparing kiln wash: Get out your trusty long-neck ketchup bottle (any tall, thin bottle will do). Add powdered kiln wash and water till it is the consistency of pancake batter. Shake well before each use.

Dipping mandrels: Dip the mandrels into the kiln wash batter and stick the handle in a block of Styrofoam, or an empty electrode box that still has the partitions. The object is not to let them touch as they dry. A single dip is OK if you are making seed beads, but when making larger beads, a second dip is required. Allow the first dip to dry about an hour before dipping again. Mandrels are usually dry enough to use in a few hours, so to be sure, allow them to dry overnight or get sneaky and put them in front of a fan.

Vermiculite: This is available at garden shops, and you want it because it lets glass cool very slowly. A large coffee can is a good container for that purpose. If you want to get fancy, use a crockpot or hotplate to keep the vermiculite warm and let things cool even slower. It's always best to use an annealing oven to remove all the stress, but using the vermiculite will get you by.

There are directions for building an oven in Creative Glass Blowing. The Feb./March '94 issue of Glassline has instructions on how to make one out of a coffee can, an electric charcoal starter and sheet metal. (Glassline is like Neon News for ornamental glass folks.)

The hard part of using vermiculite or an annealing oven is not getting anxious and removing your work too soon. Getting too curious and pulling the glass before it has completely cooled can cause thermal shock and cracking. If the beads feel warm, it is too soon to look at them.

Rake: A rake is used for making designs on beads by dragging it across different-colored sections. Stainless steel dental tools are good for this, and I got mine for $2 each at a flea market. You can also sharpen a point on one of the steel mandrels (use a grinding wheel); it can be left straight or bent at a 90-degree angle about half an inch from the point.

Tweezers: I use stainless-steel tweezers for picking up and arranging millefiori, and pulling the ends off of hot rods, and you can pinch and twist sections on a hot bead (this resembles a 3-D flower).

Graphite paddle: This is used for shaping hot glass. Roll a round bead on the paddle to get a barrel shape. You can also make beveled or cone-shaped beads by rolling the bead on the edge of the paddle.

Molten glass pliers or tongs: for making flat and disc beads. Buy tongs from Wale Apparatus for $23 or make a pair of tongs from sheet metal.

File: for cutting glass rods and removing burrs around the holes of finished beads.

Rod rest: 2x4 with a sawtooth pattern cut into it <*see last issue*>.

Colored glass: Several suppliers sell rods, or you can cut Bullseye fusible compatible stained glass into thin strips and use them as rods. Be sure all the glass you use on a single bead has the same expansion coefficient to avoid cracking. Crushed glass is available, and you can just roll a hot bead in crushed glass and then melt it on for a nice effect. Neon glass has a coefficient of 90, and so does Bullseye fusible compatible. You can crush uncoated classic glass and use it on Bullseye beads.

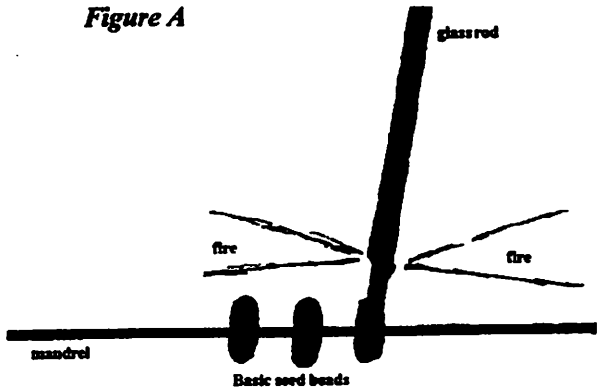
Millefiori: Little glass discs that have patterns in them, usually floral designs. You can pick up a few slices for the center of a bead or use more. Heat them in, then add more for a crazy-quilt effect.

The bead is born

Seed beads: Now that you're ready with all materials, let's make a bead. We will start with basic seed beads. Hold the mandrel overhanded in your left hand, and the glass rod underhanded in your right hand. Heat the tip of the glass rod, and tilt the other end of the glass rod down so gravity helps form a ball of molten glass. When this is formed, bring the mandrel up into the fire for a few seconds of heating, then move it just under the flame. Point the cold end of the rod over your right shoulder so it is at a 90-degree angle to the mandrel. (See figure A.)

Touch the ball of molten glass to the place on the mandrel you just heated, and pull the glass rod slightly. Keeping the glass rod in the

Figure A



fire to heat more glass, and the mandrel just under the fire, begin turning the mandrel away from you. You should see the glass trailing off of the colored rod and winding onto the mandrel. After 2 to 3 turns of the mandrel raise it up to the fire and pull the glass rod away, as you continue to turn the mandrel. Now heat the glass on the mandrel so it is even and smooth. Ta-da! It's a bead (hopefully).

If it is not a bead there are several common problems:

– **The glass didn't stick** to the mandrel: This means the mandrel wasn't hot enough. Try again. You usually have powder stuck on your glass rod: heat it up and pull it off with tweezers.

– **A big hunk of kiln wash** flaked off the rod: you overheated the

(see Beads, page 7)

(Beads, from page 6)

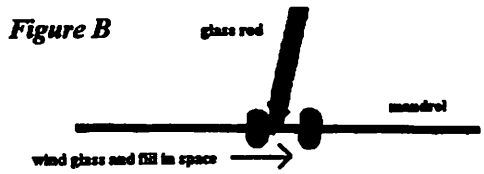
mandrel, so try again.

-- **The bead looks pregnant** or lopsided: the glass was applied unevenly or sagged when you failed to rotate the mandrel. Don't worry! While the bead is still hot, keep heating it, with the fat spot on top, next to the flame. It will sag in the opposite direction and if you keep turning it right, it will even itself out. I have taken some really ugly globs of glass and they will turn out round and smooth with a little patience here.

-- **The bead has a bubble** in it: keep heating and allow bubbles to rise to the top and pop, or poke them with the rake if they're stubborn. Don't leave bubbles in beads, for they will crack later on.

Once you get the hang of it you can make 75 to 100 seed beads an hour on a 5-point crossfire. Don't forget, as you complete each mandrel of seed beads, IMMEDIATELY bury it in vermiculite or place in the annealing oven. This is most important when you start making larger beads. Stress isn't healthy for humans or for glass!

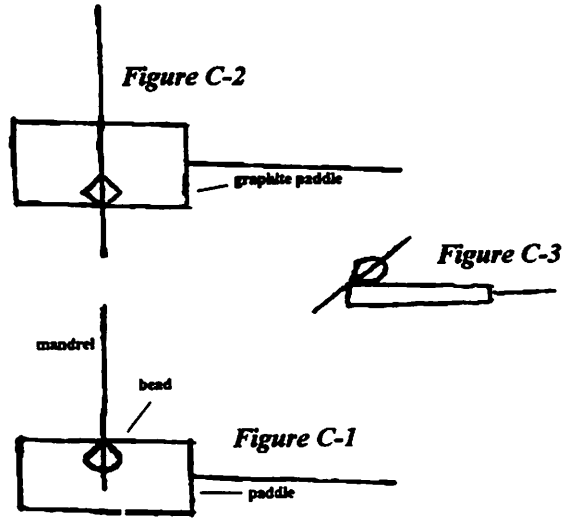
Basic bigger bead: Start out with two seed beads 10-15mm apart on the mandrel. Get a good-size ball of glass gathered up on your glass rod and touch it to the mandrel next to the seed bead on the left (see figure B). Begin winding glass onto the mandrel and gradually move to the right until the space is completely filled, Next pull the glass rod away and heat to obtain a uniform shape. You will notice



that the glass naturally retracts into a ball shape.

If you find basic ball shapes boring, get out your graphite paddle and GENTLY roll the molten bead on the paddle. Repeat heating and rolling and you get a barrel-shaped bead; square the ends by pressing on them with the paddle. Always reheat the bead to uniform temperature after the final paddle operation to relieve stress.

Bicone bead: Start with a basic big bead. Roll one side of the molten bead on an angle along the edge of the paddle (see figure C-1 and C-3). Reheat the bead and roll the other side on the opposite edge of the paddle (C-2). Repeat the process several times, gradually



obtaining a sharp bicone shape. Never force the glass by pressing down hard, just keep repeating the process until the desired shape is reached. When the shape is right, you can go back and add dots or a stripe around the center in a contrasting color. Don't forget to relieve

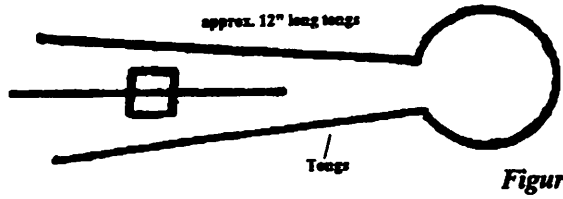


Figure D

the stress with a final heating.

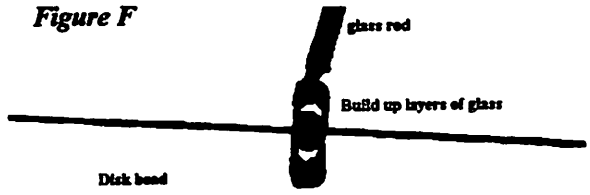
Square bead: Form a barrel bead. Get the bead hot, warm up your tongs in the torch and squeeze the bead gently. Turn the bead 90 degrees and squeeze again. Bingo! (see figure D) Repeat the process as needed, then relieve stress. The reason you preheat the tongs is to reduce stress as well.

Tear drop: Form a basic big bead. Tilt the mandrel while you heat the bead and let gravity do the work. Having asbestos fingers becomes a secret longing with this bead.

Tube bead: Act as if you're going to make a big bead, but start out with three evenly spaced seed beads instead of two (see figure E):

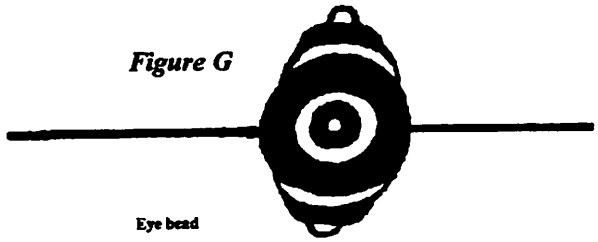
Fill in the space between the beads just like the basic bead. Feel free to alternate colors and add dots, etc.

Disc bead: Start out with a seed bead and add consecutive layers on top of each other (see figure F): Make sure each layer is fused well



before adding the next; three or four layers is about maximum for this bead. Use preheated tongs to help keep the form, and don't forget to reheat for final release of the stress.

Eye bead: Form a basic big bead. Make four large dots in a contrasting color around the center of the bead. Heat the bead and melt in the new glass. Remove the bead from the fire (ALWAYS allow the colors to "strike," or return to original color, before adding the next color of glass). Place a smaller dot in the center of the first dots. Repeat the process ending with a dot contrasting the base bead color. You can heat the dickens out of the bead to achieve a uniform smoothness, or leave the eyes raised (see figure G). I have had several



friends say that this bead has the "Madonna look"; I think it has something to do with the cone shape of the "eyes."

Tip: It's a real pain switching back and forth between colored rods when making this bead. If you seal both colors onto a glass holding rod so it resembles a tuning fork (see figure H), all you have to do is

(See More beads, page 8)

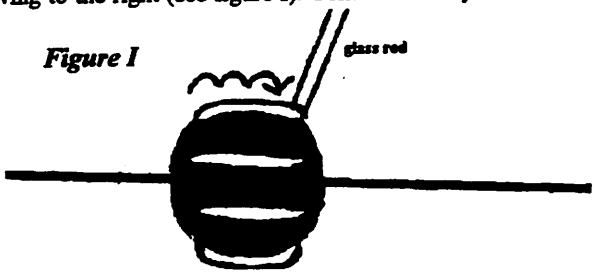
(More beads, from page 7)

Figure H

flip back and forth. This sure beats picking up, putting down and searching for rods with hot glass in the other hand.

Striped bead: Start with a basic big bead, then apply 4 to 8 stripes around the bead in a contrasting color. Once you have gathered a small ball of glass on your rod, LIGHTLY touch the left side of the bead, and raise the rod slightly before touching the bead again moving to the right (see figure I). Continue until you have moved

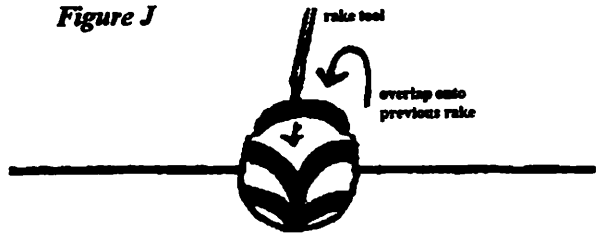
Figure I



across the bead, then pull the rod away. Repeat for other stripes. Heat entire bead to melt stripes in. Feel free to mix colors.

Striped and raked bead: Get your rake and a glass of water ready after each use of the rake dip it in the water to cool it before the next use. Start out with a hot-striped bead. Concentrate the flame on two stripes till they are molten. Using the rake, start behind the top stripe and drag it through the hot glass till it slightly overlaps the next stripe (see figure J). Drop away from the flame and wiggle the rake back and

Figure J

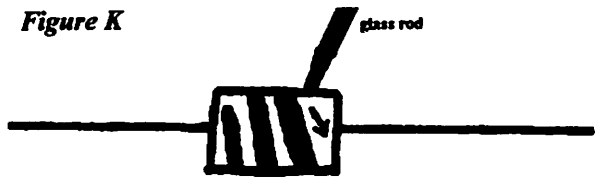


forth until it releases from the bead. Dip the rake in water, heat the next stripe, and the area where the last rake stopped, until it is molten, then touch the rake where you left off last time and rake through the next stripe. Move away from the torch, remove rake, and repeat till done. This process puts a lot of stress on the glass so take your time, don't rake through too much at one time.

Tip: When using the rake, try not to gouge too deeply into the bead. You only need to move the glass on the surface.

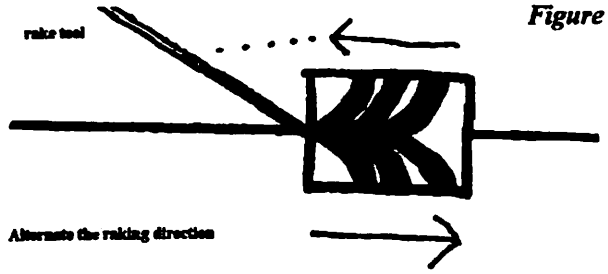
Spiral striped and snake beads: Start with a barrel bead, then form a ball of glass on your glass rod and lightly touch it to the left side of the bead; turn the bead away from you and allow the glass to trail over the bead as you move the rod to the right (see figure K): This forms a spiral. If you touched the glass to the bead heavy-handedly when

Figure K



you began the spiral, just add two dots for eyes and a tongue on the glob and it is now a snake bead. When I make a snake bead I don't

Figure L



melt the contrasting glass in until it is smooth, but leave it looking like it's laying on the surface.

Zebra bead: Begin with a spiral bead. Have your rake and water nearby. Once you have gotten the spiral bead molten, pick up the rake and drag it across the bead from left to right (see figure L). Wiggle the rake free and quench it in water, then turn the bead 90 degrees and heat that section, and repeat the process, dragging the rake FROM RIGHT TO LEFT. Repeat till you have raked four times, twice in each direction. You will have spiky "tails" on the edges where you stopped each rake; heat them individually and press down with the paddle. This keeps them from retracting into the bead when you reheat it.

Millefiori: Place a small square of sheet metal or transit on top of your crossfire head. Use tweezers to arrange the millefiori slices on your shelf. Doing this allows the slices to preheat from the heat of your torch. Make a basic big bead and while the mother is really molten start touching it to the slices and picking them up onto the bead. SLOWLY sneak back into the fire and melt in your slices. You may only be able to pick up one or two at a time; just keep repeating. You can be neat and space a few slices around the center of the bead, or get psychedelic and overlap slices over slices.

There are lots more techniques, but this should get you started.

Removing beads from the mandrel: After the bead has cooled, remove the kiln wash from each side of the bead with your fingers. Twist the bead to loosen it, and work it off the end of the mandrel. If it is stuck, put the mandrel in a vise and try again. Big beads tend to need a vise.

Finishing up: Check for sharp burrs around the bead hole. Use the flat side of your glass file to remove these. Remember, sharp edges cut beading cord. As you practice you will have fewer burrs and fewer hand cramps from filing.

Supplies: Wale Apparatus sells all the supplies you need and has a great brochure with lots of goodies for bead-makers. Get sample packs of colors to start out with a large palette of colors cheaply. Get an extra pound of clear glass so you can seal short pieces of colored glass to the clear and use it as a handle.

I've tried the "Hot Head" bead torch from Wale, It's slow, but great if you need something portable. Although the torch head is relatively inexpensive, Mapp Gas costs $8 per bottle here, and it lasts a few hours. One other drawback is some glasses blacken or change color in this torch.

Wale also has a great video by Wilson on bead-making; I learned most of my stuff from that tape.

Frantz Bead Co. sells supplies and tools too. They have a bead-maker newsletter, as owner Patricia Frantz is a bead-maker herself.

Check with your local stained glass shop for Bullseye fusible compatible glass. They will most likely have to order it for you. A "sticks pack" of colors cut into strips is available, as well as glass "strings" and crushed glass.

Ornament magazine is a great source of info and catalogs to order jewelery findings and other beads.

Well, I hope your venture into bead land is a happy one. I'm having fun and selling my bead jewelery. Christmas is coming, so you better get started... ♦

(Dorr, from page 1)

pinout is probably different. You will have to modify the software to suit your machine. As I'm not as familiar with Apples as with IBMs, I am not including software specifics for them here, but converting the examples to work on an Apple shouldn't be too difficult. (Maybe some reader will do this and write about it...)

Part I: Building the hardware

To use a computer to animate neon, you need some way to connect the two together. To do this, we will use what are known as solid-state relays. These are electronic components which can switch 120 VAC power using only a small low-voltage DC control signal. These components are used by the bucketload in industrial equipment, and are readily available on the surplus market. If for some reason you can't find them used, the new prices are fairly cheap, about a buck per amp of current rating.

The typical solid-state relay is generally shaped as a small rectangular block, with four screw terminals for connecting wires to it. You will also find them as modules which plug into a circuit card, where the wiring connections are made. Either style will work; more important are the ratings of the relay. You need relays which can control 120 VAC, at 5 to 25 amps, and are controllable by a 5 VDC signal voltage. Choose a current rating large enough to handle whatever size transformers you are using on your piece (five amps is sufficient for a single 15,000-volt transformer).

Note: Solid-state relays are also available for controlling low-voltage DC. If you're using 12-volt neon transformers then these are the kind of relays you want.

I built my prototype of this project in a wooden box, with the relays mounted inside on the bottom, and four standard household duplex receptacles mounted to the top. I cut the jumper strap between the upper and lower outlet on each receptacle on the hot (gold screw) side. This gives me two independent outlets per receptacle assembly, and therefore a total of eight separate circuits from four receptacles.

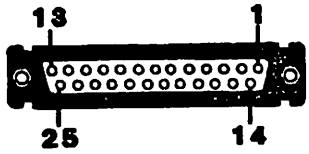
If you are powering a really large, Las Vegas-size piece, mount your relays on a metal plate to act as a heat sink. If you don't need all eight channels, you don't need to mount all eight relays. If you want to hardwire directly to transformers, modify these instructions accordingly.

The connection from the relay box to the computer can be made many ways; here are two:

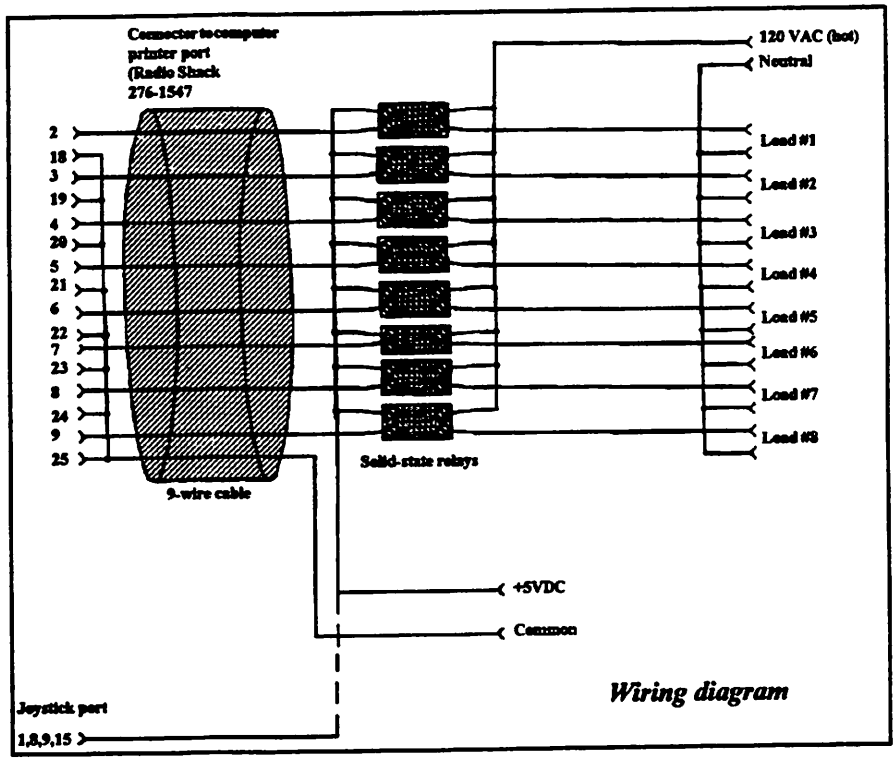
#1: Use a length of multiwire round cable (with at least 9 wires) and a 25-pin male "D" connector (this connects to the computer printer port). Neatly solder the cable wires to the connector, using insulating sleeving as needed to prevent shorts. Make a list of what color wire goes where. Cover the finished connector with a plastic backshell, available where you got the connector. This provides strain relief for the connector.

#2: Simply take a parallel-port type cable and cut the "printer" end off, leaving the 25-pin male "D" connector intact. This saves you having to solder all the individual wires; however, you will need to trace which pin connects to which colored wire. The easiest way to do this is with a continuity tester, such as a $15 ohmmeter at Radio Shack.

#3: Get a 36-pin female connector and wire it through the side of your relay box. Connect this to the computer with a standard parallel cable – this allows you to use any length cable to connect the two, allowing, say, an installation where the relay box is in the drop ceiling with the transformers, and the computer is in the office.



Here is the standard pin numbering arrangement for parallel printer ports (we'll use pins 2-9 to connect to the relays, and tie to ground pins 18-25).



Wiring diagram

Connecting the wires:

Look at the wiring diagram. There are 8 wires coming from the computer that connect to the relays, specifically the **negative** terminal on the **control** side.

Next, the **positive** terminal, still on the control side: Wire these all together, and then to a source of +5 volts DC (see sidebar for options on this).

Now for the **load** side of the relays: connect together one side of all the relays and connect these to 120 volts hot (but don't actually apply the juice yet!). Although not shown in the drawing, putting a fuse in each of these 120-volt relay leads wouldn't hurt.

Connect the remaining wires on the load side to the receptacles, one receptacle per relay, using the gold screw on the receptacles.

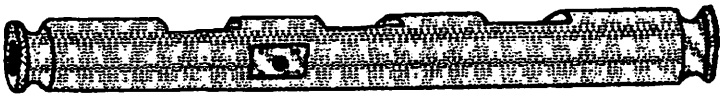
Finally, wire the other side of each receptacle (silver screw) to the neutral side of your AC source, and also connect the ground lugs from your receptacles and run them all to the ground connector on your AC

(see More Dorr, page 11)

Suppliers to the stars

For the clamp-and-pump set (stainless NW-KF aficionados and the like) one overwhelming lack in the market has been a **single main body to build a manifold around.** Sure, you can custom-order such a unit, but for megabucks. Solving this problem in a low-cost clever way is a manifold body now available from de Blaecker (Dirk Boonstra), Rotterdam, Netherlands, Tel: (31) (10) 437-7402, Fax: x415-1121.

For U.S. $180 + shipping and customs, what you get is an 18"-long aluminum tube with a 25mm internal diameter and two standard NW-25 KF fittings at each end, and four NW-10 KF openings, three for gas (in one line) and one for a gauge (perpendicular to the other three).



As we've had a "review" unit in flawless operation for 18 months, I can heartily recommend these. With our setup (HPS pirani gauge on the far end of the manifold; Welch 1402 forepump; 4" bore metal diffusion pump) this manifold practices the short-and-fat theory of speed: it'll go from atmosphere to 10 microns in 20 seconds and past 1 micron in 2 minutes; with a hot tube around 1 torr (final end of bombardment) it'll go past 1 micron in 30 seconds or less. In other words, plenty fast.

The two compromises made to keep the price down are:

1) Aluminum instead of stainless steel construction: not the "ideal" metal manifold material, but certainly acceptable;

2) Rather than true NW-KF type flanges for the four 10mm openings, there are flat surfaces with holes in the center that will mate with an NW-10 O-ring. There are four screw holes and four small clips to affix a flange with, instead of using a clamp. In practice this means a somewhat tedious process of connection and disconnection (four screws to tighten evenly, etc.), however, I need to do this so seldom that it's really not a problem. The positive side of this is that there are no welds (potential leaks) in the manifold, being machined from a single piece of aluminum.

Actown Transformers is offering the best deal on **neon dimmers:** for an additional $15 their 9,000-volt and 7,500-volt indoor frame-mount transformers come with them built in. Call (800) 531-NEON.

Didymium lens blanks (for making a pair of glassworking safety glasses) at $32/pr:

Aura Lens Products, Inc.
P.O. Box 763
St. Cloud, MN 56302
(612) 253-3082; (800) 328-7073; Fax: (612) 253-8571

Another obscurity for the obsessed: ***Glass Working by Heat and Abrasion,*** edited by Paul N. Hasluck, reprinted by Lindsay Publications, $7.95. This one's a collection of English glassworking articles from the early 1900s.

Lindsay Publications Inc.: (815) 935-5353; fax x-5477.

Jed Schleissner mentioned that the new Fisher catalogue has a "Vaccu-brand" model DVR-1 **backfill gauge,** calibrated in millibar and with NW-16 KF fittings, for around $410. Fisher Scientific, USA headquarters: Tel: (201) 467-6400; call for your district branch phone number.

White pigmented shellac (available at most retail paint stores) works great as an in-between coat for blockout paint with latex on top. It seals well to the blockout paint, covers to a solid white in one coat, dries in 15 minutes, cleans up with rubbing alcohol, and provides a great base for light shades of latex.

Tove Vils-Small of Neon Neon in San Francisco writes, "I've got good news and bad news. Bad first:

"We have been ripped off. Remember when you bought your **map wheel?** $60 or was it $70? That is a lot of money for a bunch of gears. Well, you are right. So here's the good news:

"I've found the alternative. Of course it is not made for the sign business; if it was it would be expensive. Brookstone catalog is selling a "map meter" for $12. It goes up to fifteen feet instead of 25, but so what! We are an intelligent bunch of folks, we can deal with that.

"The frosting on the cake though is that on the other side of the wheel they put an **architectural wheel.** It reads 1/8"=1'0", 1/4=1'0" and 1/2=1'0". So easy as a breeze you can get a pretty close idea of how many feet that gigantic border-tube job really is with just a blueprint and your wheel (instead of paying $140 for an electronic architects' wheel).

"Anyway, Brookstone's number is (800) 351-7222 and the item order number is 029629."

Matt Thompson called to mention "a really nice neon clock unit, complete with neon, at a good price:" **Lumicron,** out of Grand Rapids MI: (616) 774-2869; Fax: x-0382.

Knockout blockout

Polston "Neocoat" blockout paint, reviewed by Ted Pirsig

It's the details of daily life that can make or break you in the glass shop. You're rushing to get done, you stack the straight tubes all together on the roof rack, get to the site, and "What's this? The paint has glued together between tubes, peeling off some? But I painted those four days ago!"

We all know the perils and pitfalls of FMS "Sta-zon" blockout paint, as well as the virtues. It's fast-drying, has good coverage, and it will always re-wet with solvent (useful for brushes left dirty). In Europe, where American neon supply manufacturers have otherwise made few inroads, FMS paint is well-known.

Yet it's difficult to touch up (a little too easy to re-wet), smelly, full of hazardous gunk (ever seen the MSDS sheet on it?), and has the above-mentioned problem of "dry" tubes sticking to each other.

Enter Polston. While I believe there are other manufacturers of water-based blockout paint, this is the one I'd heard about and ordered. Its prime virtue -- no smell, easy cleanup, not a health hazard -- are enough to make one overlook the problems. Touching-up without any "rewetting" is nice too.

But there are a few problems, notably that it came way too thin to get decent coverage -- I had to leave the cover off the jar for two days to get it to evaporate down to something useful -- and it takes a long time to dry, invariably dripping down onto an unpainted section of tube (but then, we live in a very wet climate, so this may be a local phenomenon). And, as with all latex-type paints, you remember to clean the brush or you buy a new brush, no second chance.

Of course, the final test is longevity, one we don't have any data on yet -- ask again in a few years.

To find a local distributor contact Polston Enterprises, Philadelphia PA, Fax: 215-473-5251. ♦

(More Dorr, from page 9)

source.

WHATEVER YOU DO, KEEP THE AC WIRING WELL SEPARATED FROM THE LOW-VOLTAGE WIRING TO THE COMPUTER. A SHORT HERE WILL INSTANTLY TOAST THE COMPUTER!

To test the finished unit, I hooked up some 110-volt Christmas lights, one per circuit.

A final safety note on the hardware: **power should always be disconnected completely from the relays before working on your neon.** This is because of the way the circuitry inside the relays work: they are never truly "off." There is a slight leakage current (a couple of milliamps). This is enough to create a stimulating high voltage on your transformer secondaries!

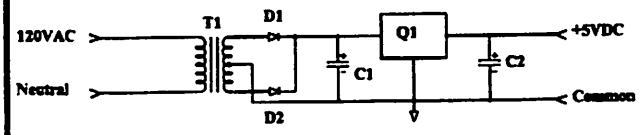
5 volts DC

You can get your 5 volts DC from a number of places:

– inside the computer itself (the red wire on the four-wire power cables to the disk drives, for example);

– from the computer joystick port, if you have one (needs a 15-pin male "D" connector, or old joystick cable); or

– from your own power supply:



— Parts List —

C1 - 220uf / 35vdc capacitor	272-1017 (Radio Shack)
C2 - 4.7uf / 35vdc capacitor	272-1012
D1,2 - 1N4001 diode	276-1101
Q1 - LM7805 5 volt regulator	276-1770
T1 - 12.6vac ct transformer	273-1365

For my prototype I built this power supply using parts from Radio Shack. It's built on a small circuit board and mounted in the box with the relays. This keeps connections to the computer down to a minimum.

Part 2: Software

<Telford sent to us a disk with 20 animation programs (such as "spell," "wipe," "random twinkle" and lots of chase variations) and he has graciously allowed us to offer a copy anyone who is interested. To get a copy, please send us a disk (any size) with return postage.

To run these files in Basic on our DOS 4.01 machine required the following few steps:

c:>GWBASIC

F3 (load) <filename>

F2 (run)

SYSTEM (to quit)

This way you can get your animator up and running without having to learn the programming. However as Telford notes, some "tweaking" will probably be required to get these to run on a given machine. And once your hardware is tested and you've got the basics down, a whole world of Basic awaits you.

Telford recommends for Qbasic (DOS 5.0) the MS-DOS Qbasic Programmers Reference by the WAITE group, Microsoft Press (ISBN 1-55615-34?-3). "It's a mediocre tutorial but excellent reference.">

We are going to program our machine using the BASIC computer language. Make sure your machine has this. Most copies of DOS include BASIC: any version (BASIC, BASICA, GWBASIC, QBASIC) will work. Note: the really early IBMs had BASIC built into the ROM BIOS (the part of the machine which tells it how to operate its hardware). With these, you don't even need any disk drives on the machine – just the bare-bones minimum.

I assume that you have enough knowledge of your machine to start up the BASIC interpreter, enter, edit, and save simple programs. If not, the tutorial manuals which come with most machines will help you here. If you don't know BASIC, don't worry. Use the sample programs included here as a starting point, and tweak them to suit your needs. Of course, the more familiar you become with your machine and with BASIC, the easier it will become to create the visual effects you want. If you are already proficient in some other computer language, feel free to use it instead.

Theory of operation

A computer communicates with an attached printer by sending it codes and commands as a sequence of numbers. Each letter, digit, or symbol that the printer prints can be expressed as a numeric code. The computer treats our attached relay box similarly to the printer: by sending various numeric values to the printer port, we can turn on or off the various relays.

A computer holds numbers internally as a group of one or more bytes, where each byte contains eight bits, and each bit can have a value of either "one" or "zero." Coincidence! We just happen to have eight relays under our control, one for each bit in a byte of data. All we have to do is send a series of data bytes, where each bit in the data byte indicate the desired state of its driven relay, on or off, to our printer port, with an appropriate time delay between each byte.

A data byte can be expressed as a numeric value from 0 (all relays off) to 255 (all relays on). Each bit in the byte has a numeric weight, based on a binary sequence: the first bit (relay #1) is worth 1, the second bit is worth 2, the third bit (relay #3) is worth 4, etc., following the binary sequence 1, 2, 4, 8, 16, 32, 64, 128.

Therefore, if we want to turn on, for example, relays #1, #2, #5 and #8, we add up their bit weights, 1, 2, 16 and 128. The total, 147, is "conditioned" and sent to the printer port, activating the appropriate relays. All other relays stay off.

These number values typically come from (1) a predetermined sequential list of data bytes (called an "array") which you enter, or (2) can be generated on the fly, based on the value of the previous byte sent. Random sequences usually use the former method, while chase sequences use the latter.

The delay between data bytes is generated by having the computer perform some mindless task, like 'counting by ones' up to some large number (the bigger the number, the longer the delay). Again, this target number can be a constant value, an item from a list of numbers, or based on the previous number, depending on what kind of delay you want. The value needed will vary depending on the speed of your machine. You will undoubtedly need to change the numbers used in my examples to run properly on your machine.

If the delay isn't great enough, you can program two layers of counters, where you count up to some large number a large number of times. The delay is approximately the product of the two counts. On the other hand, try to avoid flashing neon faster than four to eight times per second. The relays and transformers don't seem to like it.

One final detail: we need to tell the computer which printer port (there are three possible) to send our data bytes to. Each port is referred to by its address. The three addresses are '3BC', '378' and '278'. The easiest way to determine which one it is to try them, one at a time, in the sample programs. If the address is wrong, nothing happens. By the way, if your computer has multiple printer ports, there is nothing keeping you from fabricating up to three relay boxes, for a total of 24 channels! (You can buy an additional printer port card for about $15 mail order).

Example program #1

Let's look at the first example program. This is an eight bulb chase sequence, i.e. each relay is turned on in numerical sequence. After a set time delay the relay that is one turns off and the next one turns on, and at the end of all eight the whole cycle starts over again, endlessly.

Here's how the code gets the job done:

```
100 '-------------------------------------------
110 ' title: seqchase.bas                       |
120 '  one bulb chase - 8 seq                   |
130 ' revisions: 3'28'92 - init release         |
140 ' 8 bit programmable sequencer for lighting displays  |
150 '-------------------------------------------
```

(see Still more Dorr, page 13)

Feisty veteran shares kind words, trade tips

By Jerry Bolton

Three kudos to Nancy, Val and Mark; a partial retraction; and more pungency from a feisty veteran (your words):

I liked **Nancy Hannmann's article on self-employment**, but don't agree entirely with her views. I learned a long time ago to DELEGATE work load to others, i.e.: friends, family, accountants or hangers-on. If they come to watch and take up your time with questions, put a brush, broom, or unbalanced checkbook in their hands or kick 'em the hell out so you can do your main function: bend glass! Then your self-employment can be fun. I totally agree with her view about trade secrecy in our industry and what to do about it (more on this later). I think anything we can do individually to help us all as a whole will better this industry in general, and screw the dinks who keep their knowledge to themselves.

So, Nancy, I will support an organization of tube benders wholeheartedly.

Good on ya, Val! I like someone who takes the bull by the horns, turns him over and tweaks his testicles. There are **plenty of fine women in this trade** and I personally prefer to train women as they have more patience and seem to be more meticulous about learning properly, and I think they should stand right beside the men to be recognized, whether it be for their work in neon sign production or neon art!

As we all know, Mark Snyder manufactures **oil diffusion pumps**, so he is naturally prejudiced toward their use, but BY GOD he backs up his product with scientific proof from other sources, unrelated to the industry and therefore they don't have to "politic" to sell a product. The only thing I've heard about turbo pumps is generalizations, not scientific facts. In fact I received a letter from a "mate" in Australia who uses one in his shop extensively and states, "I think they are crap and have no place in a busy commercial shop – too slow, too delicate and too expensive to fix. (3000 New Zealand dollars for a turbo overhaul!)." So hurrah for Mark's article and his scientific backup. We need more of this type of information, so us laymen can decide what suits us best, individually.

A word of caution pertaining to my last article about **using your state college to build a manifold**. It was pointed out to me that these colleges and their employees are state (or federally) funded and by using them without going through proper channels you could be subject to a lawsuit, and who knows, in this day and age if you spit on your neighbor's sidewalk, they'll sue! Anyway, cover your ass and go through the proper channels, or talk to the commercial suppliers about building a manifold to your specs.

A few more tips: Go to your local machine shop supplier or machine shop and ask for a product called "**Never Sieze.**" Take the slide out of your ribbon burner, apply a little, and it won't stick any more. Also apply some to the barrel or body of your ribbon burner (where the head goes on) and the core of your sliding choke on your bombarder. It makes things slide and turn a lot easier (clean everything before applying).

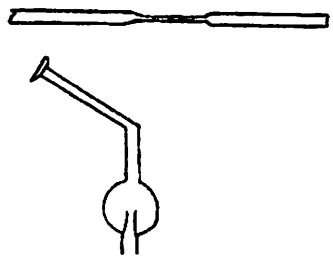
The single-head torch Kevin Rourke was referring to is a Vigor or Hoke **jeweler's torch**. Most shops around the Philly and Atlantic City areas use them instead of splicing or tipping torches. They are gas/oxygen fed and are very hot. After you get used to moving them around for even heat they are great for splicing and tubulation. Very fast! They can be bought through Ed Mar Co., 710 Sansom St., Philadelphia PA 19105; 800-346-7614.

George at J&P Machine (201-779-6158) advises using a **venturi valve system** on each side of your crossfire so you can adjust them individually. I did this, mounted the whole crossfire assembly on 3/4" by 8" by 8" plywood, then took the seat off a bar stool and mounted the plywood to the bearing assembly. I now have a crossfire I can turn in any direction and I can "fine tune" each side seperately, rest one foot on the stool's foot rest while heating a bend, all on one stable stand. George makes the venturi valve assembly and will sell direct. You can buy two from him for the price of one from a sign supplier. He'll tell you the right size venturi to fit your fires.

Bought **EGL's new round tipping torch** (#EGL 500) – cheaper than Voltarc's t-500 and the big advantage is when the tips wear out you can unscrew them and replace them. BE SURE, the moment you get it, to lay it on a piece of transbestos and trace it very accurately, so when you drop it or knock it out of whack you can rebend it to the pattern.

We've all had problems with mercury tubes snaking, right? One way to stop this is to put a **single-point flasher on your burn-in transformer**. When the tube starts to snake during burn-in, turn on your flasher so the tube goes off and on until the snaking stops, which happens very quickly, then switch over to steady burn-in. If interested, call or write and I'll send you a wiring diagram and parts list to set this up so you can bypass the flasher when not needed.

A great "**spit-catching**" **mouthpiece**: Blow a bubble in your 5mm tubulation glass, cut off one end, take another piece, stretch it out, insert it into the end of the bubble, weld it in place. Bend the other end to your desired angle, cut it to length, flare it out and fire-polish, cut the blowhose end to length, fire-polish and you have it. Takes practice, but no more clogged blowhose!



When you put a long tube or tubes, (i.e., two eight-foot borders) on your manifold and it seems to take forever for them to pump down so you can bombard them, when you feel they should light but they don't – touch them briefly with your **tickler**, then hit the bombarder again and chances are they'll light. Don't know why this works but it does.

Keep a **hand-held vacuum cleaner** in your shop to clean your tables rather than brushing them off – this way you don't raise dust and dirt to settle in your electrodes and tubing. Keep a good upright for the floors too.

I bought a **heat gauge** from PNL about two years ago and while the gauge is large and very easy to read, I've had to send it back two times to get the wire replaced at $75 a pop, plus shipping both ways and it's broke again. I know of two other sign companies that have had problems with this gauge. Mark Snyder's people tell me it's due to mishandling. WRONG! I think Mark's products are top of the line, except for this gauge that I feel has a design flaw. I've had a Tubelite gauge (now handled by Transco, not Tubelite) for six years and haven't had one bit of trouble. ♦

(Still more Dorr, from page 11)

```
160 '
170 DEFINT A-Z
180 '
200 VALUE = 1
210 FOR I = 1 TO 8
220  GOSUB 940
230  VALUE = VALUE * 2
240  DELAY=10:GOSUB 840
250 NEXT I
260 '
700 GOTO 200
800 '
810 ' Delay Subroutine
820 ' This subroutine wastes time
830 '
840 FOR DI = 1 TO 6 * DELAY:NEXT DI:RETURN
900 '
910 ' Output Relay Driver
920 ' Transfer relay image value to the hardware
930 '
940 OUT &H3BC, VALUE XOR &HFF:RETURN
```

Line 100, and every line starting with an apostrophe, is a comment line (i.e. notes written to ourselves). They do nothing in the program. You don't even need to enter them -- your program will work fine. They do help remind you of your train of thought when you re-read your program six months from now.

Line 170 declares all 'variables', which are named places where a number can be stored, as 'integers'.

Line 200 puts the number '1' in a variable named 'value'.

Line 210 is the beginning of a 'loop', which is a sequence of code lines which are executed repeatedly. In this loop, all following lines down to line 250 (the end of the loop), are executed eight times. The 'I' variable is a counter for the loop.

Line 220 causes the program to go to line 940, do whatever it says, and then come back here. Line 940 'conditions' the number contained in the variable 'value', and then sends it to the printer port. As the current number in 'value' is 1, the first relay should turn on. Note the address of my port was '3BC'. If yours is different, change the value here. Be sure that the '&H' prefix is in front of your address number -- it tells the machine what kind of number (hexadecimal) it is.

Line 230 doubles whatever number is in 'value'. 1 becomes 2, 2 becomes 4, and so on. Note this follows our binary number sequence, described earlier.

Line 240 puts the number 10 into a variable named 'delay', and then does whatever is on line 840.

Line 840 is our time-wasting loop. It tells the computer to count from 1 to a number six time whatever value 'delay' contains. By changing the value put in 'delay', we can adjust the amount of time wasted. The faster your computer, the bigger a value you'll need. The number '6' is arbitrary. I chose it such that any change made to the value of 'delay' would have a noticeable effect on the delay time. You can use any value here you see fit.

Line 250 is the end of the loop. After eight passes through the loop, one for each relay, line 700 tells the program to go back to line 200 and do it all over again.

Example program #2:

```
100 '-------------------------------------
110 ' title: seqosc.bas                   |
120 '  one bulb up/down chase             |
130 ' revisions:  3/28/92 - init release  |
140 ' 8 bit programmable sequencer for lighting displays |
150 '-------------------------------------
160 '
170 DEFINT A-Z
180 '
200 VALUE = 1
210 FOR I = 1 TO 8
220  GOSUB 940
230  VALUE = VALUE * 2
240  DELAY=10:GOSUB 840
250 NEXT I
260 '
270 VALUE = 128
280 FOR I = 1 TO 8
290  GOSUB 940
300  VALUE = VALUE / 2
310  DELAY=10:GOSUB 840
320 NEXT I
330 '
700 GOTO 200
800 '
810 ' Delay Subroutine
820 ' This subroutine wastes time
830 '
840 FOR DI = 1 TO 6 * DELAY:NEXT DI:RETURN
900 '
910 ' Output Relay Driver
920 ' Transfer relay image value to the hardware
930 '
940 OUT &H3BC, VALUE XOR &HFF:RETURN
```

Suppose we want to modify our sequence order, from relay 1, 2, 3, ... 8 and then back to 1, to one which oscillates back and forth, i.e., 1, 2, ...,7, 8, 7, ... , 2, 1, and then repeat.

Note that lines 200 through 250 are similar to the previous example (with line number changes). The difference is the added lines 270 to 320. While lines 200 to 250 cause the relays to sequence from 1 to 8, lines 270 to 320 sequence the relays from 8 to 1 (reverse order). Note that both code blocks use the same delay routine (line 840) and port output routine (line 940). This way, any future changes to these functions need only be made in one place.

Example program #3:

```
100 '-------------------------------------
110 ' title: seqosc2.bas                  |
120 '  2 bulb up/down chase (smoother)    |
130 ' revisions:  3/28/92 - init release  |
140 ' 8 bit programmable sequencer for lighting displays |
150 '-------------------------------------
160 '
170 DEFINT A-Z
180 '
200 DIM SEQ(16)
210 SEQ(1) = 1
220 SE2(2) = 3
230 SEQ(3) = 6
240 SEQ(4) = 12
250 SEQ(5) = 24
260 SEQ(6) = 48
270 SEQ(7) = 96
280 SEQ(8) = 192
290 SEQ(9) = 128
300 SEQ(10) = 192
310 SEQ(11) = 96
320 SEQ(12) = 48
330 SEQ(13) = 24
340 SEQ(14) = 12
350 SEQ(15) = 6
360 SEQ(16) = 3
370 '
400 FOR I = 1 TO 16
410  VALUE = SEQ(I)
420  GOSUB 940
430  DELAY=10:GOSUB 840
440 NEXT I
450 '
700 GOTO 400
800 '
810 ' Delay Subroutine
```

(see Yet another Dorr jump, page 15)

Installing: in, out and up the wall

By Ted Pirsig

Time once was I stared into a torch all day, every day, which can get kinda boring so off we went and started our own business. This meant learning everything else, often the hard way. These days I still prefer torch work over the rest (up to a point), but we take whatever we get in this strange economy.

Here are some tips and strategies, techniques and supplies that I've time-tested a bit.

In a recent Signs of the Times article Paul Davis notes that he will no longer show anything but UL-approved techniques, as he gets so much flack when he strays. Getting everyone up to speed with UL is an admirable goal; however, I live in Hawaii. Like quite a few places there seems to be not a single electrical inspector in the state who knows the first thing about neon. (It'll probably take a few more fires.) Thus, anyone who bids to strict UL standards is at a great disadvantage.

In seven years of glass work here (including tons of wholesale and three years of working for two of the largest sign companies), I've done about six jobs with PK-type housings (not counting repairs on pre-1960s signs, or sign installations from mainland sign companies); everything else has double-back electrodes.

So I take a pragmatic approach. I firmly believe that one can have a safe sign installation without full-blown UL, particularly when using transformers smaller than 15,000-volts.

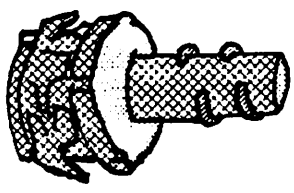
In the spirit of not-UL-but-better-than-what-usually-passes-around-here, here's a couple items & configurations to pass along:

– Getting conduit down in a wall: The job blueprints called for D-C (Diversified Components) type through-wall connectors, which I understand are not UL-listed for neon (though commonly used). This job also spec'd on the prints that tie-wire inside 5mm glass was to be used for jumps, for double-back electrodes mounted on a carpeted wall (I talked them out of that one, using GTO inside heavy-wall glass sleeving instead). The wall-mounted neon had connections that were 30 to 40 inches down from the ceiling. There was no access on the back side of the wall, which had a standard 3-1/2" air space, only from the top of the wall, above the ceiling. Fortunately there was no horizontal plate or other obstruction. Still there was no way I could reach down 40" inside the wall to screw a nut and conduit onto the backside of the D-C fitting, so I had to devise something else:

1) First I mounted the neon on the wall, to see where my electrodes landed. Then I removed it and drilled 1/2"-diameter holes for the D-C fittings

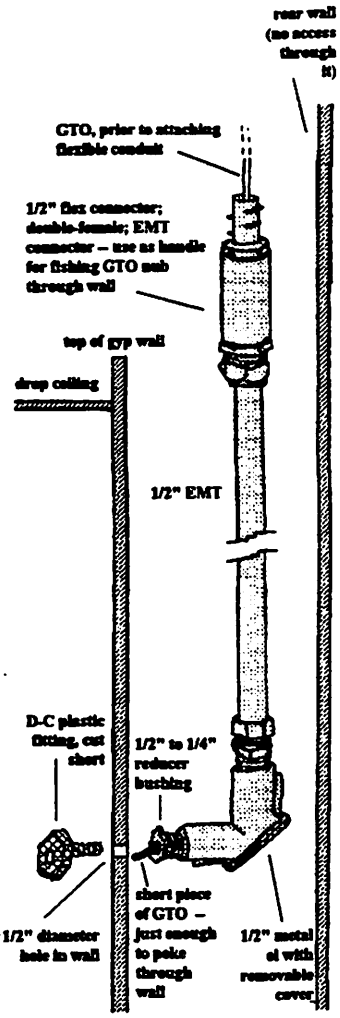
2) From on top of the wall I was able to drop this conduit assembly down inside (see illustration), and feed the short nub of GTO through the wall. (Note that the GTO had to be pre-wired into it, as there was too much friction on the tight corner to feed it through later.) The rigid conduit gave me a handle with which to manipulate it in the wall, and by starting out with just an inch or so of GTO threaded through I was able to peer down the inside of the wall from on top, pass the stub of GTO through the hole, grab it from the outside and pull it further out.

3) At this point I threaded the D-C fitting (cut down to about 1-1/2" long) through the wall and into the metal reducer bushing on the conduit. It's not a perfect match: the reducer bushing has 1/4" pipe thread (which tapers) and the D-C fittings aren't tapered, but still the connection was solid.



Pop-in flex connector

While stocking up on conduit fittings my local **GE Supply** distributor (check your local phone book) pointed out a new type of connector for flexible conduit that pops into the hole and locks in place, no lockring required. These saved me many trips to-and-fro on a recent one-man channel-letter installation, as I could just stare through the (larger) wall holes at the backs of the letters and the holes cut thereon, cut flex conduit to length, feed a somewhat longer piece of GTO into the flex, twist on the new pop-in connectors onto the flex, and then pop the two ends into the letter backs (no running to the outside and threading nuts on).



You don't want this to happen to you:

Last year at a "Tilt" video arcade site I was speaking with the rather taciturn construction supervisor, and it turned out we were both from Minnesota (once upon a time). He became less taciturn.

Tilt has over two hundred stores around the country, and I said "You must deal with a lot of neon folks."

"Yup. You know, most neon guys are, well, real artistic" (this was not a compliment).

"Yeah?"

"I supervised a big store near LA. I mean a big store. The neon guy is there installing and I said to him, 'You want to light up each circuit as you go?' and he says 'No, I like to get the full effect of turning them on all at once, at the very end.' He was installing each section as he made 'em. 'O-kay' I said, so weeks later the guy finally hits the switch and guess what, the ones that were supposed to be hot pink were purple. He was looking so proud of himself, 'till I pointed out to him on the blueprint that the color was wrong, and he flipped out. Then he tried to get me to call my boss, offering a big discount, like five grand, to leave it like it was. I didn't even bother calling my boss, I just told him to take it down, do it right. He really had to eat it on that one."

(Later, when It came out that I was ahead of schedule, there was a long silence and then "You ain't no ordinary neon guy." I took it as a compliment.)

(Worst part of the job? They kept the place open, video games squawking, throughout the remodeling. I haven't hung out in an arcade since I was 14, when it was all pinball machines – my old tricks for getting free games (lifting the table up onto steel-toe shoes to defy gravity, or popping the ball around with a strong magnet) didn't help me any. On the final day of the 78-hour install I had the flu, big time, and between having to keep working (joys of self-employment on a deadline) and the noise, I now have a nightmare vision of the end of the world: cheeps and beeps and roars, machine generated snarls of "You lose!" and

(See Install, page 16)

(Yet another Dorr jump, from page 13)

```
820 ' This subroutine wastes time
830 '
840 FOR DI = 1 TO 6 * DELAY:NEXT DI:RETURN
900 '
010 ' Output Relay Driver
920 ' Transfer relay image value to the hardware
930 '
940 OUT &H3BC, VALUE XOR &HFF:RETURN
```

If you run example program #2, you will probably notice that the effect is visually somewhat harsh. We can soften it by having two adjacent channels active at any given time. This example activates relays in the following order: 1; 1 and 2; 2 and 3; 3 and 4; etc. The method used to implement this example is different than the previous ones. Here, we create a list (an 'array') which holds our desired sequence, and we use the counter in our loop to select which entry in the list is sent to the printer port.

Line 200 defines an array of numbers, named 'seq', 16 entries long. Lines 210 through 360 assign values to the array. Line 400 is the loop instruction. 'I' is the loop counter variable.

Line 410 sets the variable 'value' to a value from the array, as selected (indexed) by 'I'. Line 420 causes the program to call our port transmission function on line 940. Line 430 calls the time delay function, as in previous examples. The rest of the program is also similar.

As you can see, using an array to hold our sequence allows us to create any pattern imaginable. You could supplement this by creating a second array to hold a list of delay values, allowing different delay times for each step in the sequence. For any given sequence step, use the same index number to access each array.

Summary:

The software examples presented here hardly even scratch the surface of what is possible for a creative person to do. The methods I used in my elementary examples represent only one of probably dozens of different ways to program the described sequences. You will undoubtedly find your own preferred methods. You can create animation using a multiple of different techniques, all in the same program. There is no 'right' or 'wrong' way to write the program, as long as you are getting the results you want. Experiment! Enjoy!

I would be interested in seeing pictures of any projects built using this animator, as well as any comments that readers have to offer.

Additional data:

<Anyone who figures out the specifics for Apple machines – please send it to us and we'll publish it. (Likewise for anyone so bold as to make a user-friendly Windows format for system control!)

If, perchance, you can't get or don't want an ancient IBM PC, the going mail-order rate for a new 386 SX with minimum hardware (1 meg memory, single disk drive, monochrome monitor, no hard disk) will run you less than $400.

Here are a few mail-order sources for solid state relays (both new and used) and computer connectors (they all have catalogues):>

All Electronics Corp.
P.O. Box 567
Van Nuys, CA 91408
800-826-5432
818-904-0524
Fax: 818-781-2653

Marlon P. Jones & Associates
P.O. Box 12685
Lake Park, FL 33403
407-848-8236

Altex Electronics
11342 N IH 35
San Antonio, TX 78233
800-531-5369
Fax: 210-637-3264

Extensive electronics catalogs, new only:

Newark Electronics
800-298-3133 for catalog and nearest distributor

Mouser Electronics
800-346-6873 for catalog

♦

12-volt unit update, new GTO splice assembly

More from Telford Dorr:

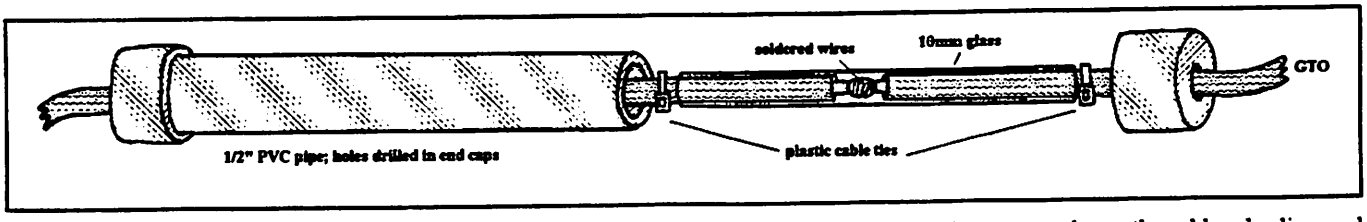
Regarding the 12-volt high-frequency power supply *(see last NN)*, I have incorporated several minor changes to the unit:

1) increase the primary wire size to 18 gauge;
2) increase the heatsink size from 3"x3" to 3"x6" (or larger); and
3) increase the maximum allowable supply voltage to 24 VDC.

These changes allow a much greater output power. At 12 VDC, the unit performs the same as before.

<Ed DeZuzio also pointed out to us the hazards inherent in scavenging old televisions: there are capacitors inside that can hold up to 10 kilovolts. The way to deal with these is to 1) locate them: they are usually cylinder-shaped, an inch or more in diameter and several inches tall (and also the picture tube itself!); 2) drain them by shorting across the terminals, keeping yourself well insulated in the process!>

Also, here's a home-made high-voltage GTO splice assembly that I use around the shop. The novel features here are the tie-wraps



used to keep the 10mm glass centered over the soldered splice, and the PVC cover which keeps the glass from getting broken, as well as adding extra insulation. For permanent installation the end caps may be glued on. A shot of silicone seal in each end cap should make it watertight, but I don't recommend exposed GTO outdoors. These units are handy for extending the leads from window frame-style transformers. ♦

(Install, from page 14)

"Hey, pardner, how'd you like to try your luck?," the only human voice an under-the-breath "Fuck!" as counterpoint.)

You know it's going to be one of those jobs when you give a bid (based on a verbal description, one that says "wood wall" and "straightforward and easy") in April, then hear nothing until October, a phone call saying "Your'e on! Can you do it this weekend?" and when you visit the site, discover tile, tile everywhere. 1) Redo the bid, to about double, then 2) get yourself a diamond-tip hole saw, expensive buggers but worth every penny. Our particular job needed 24 1-1/2" diameter holes for PK housings (Mainland sign company, hoity-toity mall), and the advice I got from another installer was to stuff a rag into the hole saw chamber and frequently dip it in water, to keep it cool, otherwise it would burn out in a hurry. Then be prepared to spend about 30 minutes per hole drilling, depending on tile hardness.

Well, figuring that if a little water is good, a lot would be great (though messy), I brought along a spray-bottle and sprinkled constantly while drilling. After drilling out 1/4" pilot holes with a standard carbide-tipped masonry bit, the 24 large holes only took 50 minutes! Cleanup did take nearly two hours, and had to be done before proceeding further lest I track swamp water everywhere, but hey, well worth it! When done the bit showed only minor signs of wear. The diamond hole saw bits are made by Starrett; we got ours from McMaster-Carr Supply Company, Santa Fe Springs, CA; Tel: (310) 695-2449; Fax: -2323, about $58 each (+ $12 for a standard mandrel).

Two from hell: Sign people are usually the last ones to arrive at the site, and also the last ones (if ever) to be consulted about anything. The worst case I've seen of this involved a remodeled storefront (within a mall) where the carpenters had merely covered over all the existing hardware from the previous sign (ever try and remove a set of fluorescent fixtures from the back side, completely framed into inaccessablilty? You'll need your Sawzall, hammer and a goodly dose of curses). They'd also managed to frame in the roll-up security door in such a way that it couldn't be released into the ceiling, staying quite in the way. For every PK housing we had to have the door in an all-the-way lowered position and then cut out sections of the bars with the sawzall, up above the drop ceiling where it wouldn't be seen. What should have been a four-hour job turned into 14 hours.

And finally something truly bizarre: Three sets of interior "Payless Kids" signs that I went to repair (another company's install). They were not large, maybe 12-14" letters, with "Robbi" housings inside (read: "nightmare tight fit"). The cans were aluminum, less than six months old, painted on the outside but left bare aluminum on the inside. I was not prepared to handle what confronted me when I opened up the first faulty letter: Snow. Lots of it. Inside a mall in Hawaii. Acid snow, crystalline and flaky, converging into liquid in other spots, and just green corrosion-dots where there used to be tube supports. Neon resting against the bottom of the can. As best I can determine:

1) The awkwardness of the fittings led to less-than-perfect seating of the tubes against the springs in the Robbi housings, which led to tiny amounts of arcing and concurrent ozone gas.

2) The unpainted aluminum, in the presence of ozone gas and high humidity (Hilo, Hawaii: wettest city in America) severely corroded, as did the metal tube supports.

3) As the tube supports corroded and weakened, they allowed the neon to slip downward (the openings on the Robbi housings faced downwards) resulting in a larger air gap, creating even more ozone and corrosion.

One of the letters was so bad that the entire can had to be replaced, and the acid had oozed to the outside and ruined the paint, as well as eating the glue along the plex-to-trimcap edge. ♦

Neon ed. 101:

Notes toward a buyer's guide

<Editor's note: The following is an article intended for a non-neon crowd, such as retailers and designers; our purpose in running it here is to solicit feedback from you.>

By Val Crawford and Ted Pirsig

Neon draws plenty of attention, but even sign customers who love neon don't know the first thing about it. If a tube lights up, it looks great to most folks on the street.

People outside the trade don't know good bending from bad, dangerous wiring from safe, good design from schlock. They don't notice blobby bends, the telltale signs of multiple welds; few customers even know enough to question stained or buzzing tubes.

And since retail neon sign buyers don't understand basic safety or wiring rules, they can't keep small problems from getting bigger. They also don't have much legal protection against lousy work.

So "let the buyer beware" is a bit too much to ask. The evidence of this ignorance is found in the stained, kinked, buzzing and arcing disasters that were evidently paid for and are proudly displayed by so many businesses.

In the long run, the customer's ignorance about quality and safety hurts the neon trade and every reputable shop in it. Undiscriminating customers never learn to appreciate (and pay for) quality; they go for the lowest, dirtiest bid. And how can they order good design unless they've seen some?

Rather than "let the buyer beware," we hope the following neon basics can help buyers be aware.

The public should know what warning signs to watch for, the basic signs of good bending and wiring, and what's reasonable to expect in terms of tube and transformer life. If customers know quality neon from junk, maybe we won't hear (and we have), "Oh, neon only lasts six months; that's what my friend told me." Or "Neon's too dangerous; it starts fires." And maybe we won't have to look at so much flickering, stained and ugly tubing on permanent display.

1. The big picture: Neon's history and uses.

Sign customers should know that the range of neon applications is far broader than what they are likely to have seen recently: flamingos, beer signs and open signs. Neon has been around in various forms for nearly a century. Neon was the key to Times Square, to "spectaculars" that caused traffic jams, to movie marquees and art deco curves and diners and roadsides and nightlife. It is the fine neon craftsmanship lavished on huge signs that gave many cities and products their identities, and the medium's genius and diversity are seen in many smaller signs that still remain trusty after decades of constant use.

Unfortunately, most neon history is nowhere to be seen: not even recorded, much less preserved or restored. For example, few residents of our city, the old sugar town of Hilo, know that neon was used to light billboards and on the train station clock. Instead, we once were told – by planners who should have known better – that neon was not consistent with the "historic image" the town wants to present.

The plastic signage that usurped neon's popularity in the postwar years has now lost favor, and neon is enjoying a renaissance of popularity and new applications, which stretch far beyond window signs into architectural lighting, art, point-of-sale multiples, and consumer goods such as telephones and car neon. Neon can provide efficient battery-powered lighting for vehicles and remote locations, and even for toys and gifts.

Neon can be used with many other media as well, for some

(see Neon education, page 17)

(Neon education, from page 16)

striking combinations: glass bricks, frosted or engraved plastic, water, paper, ceramics, metal, motors and moving parts.

Naturally, certain things come to mind when people think "neon," particularly when those people are considering buying neon signage. However, what they don't think of may be much fresher and more effective. In short, if customers see neon as an exciting medium, they may be more willing to do exciting things with it.

2. Neon physics: How it works.

All neon is hand-made, and illuminated tubing fabrication is a highly technical and specialized field.

All neon lighting depends on a transformer and a tube. The tube simply surrounds a medium which turns the electric energy coming out the wall into light, and the transformer converts the regular electricity into a form the neon tube can use.

And some neon isn't neon: luminous tube lighting is commonly called "neon" for one of the gases used. Glass tubing is vacuum-pumped and heated to remove all air and impurities, then is filled with one of several pure gases. Any gas would light up inside the tube, but only neon, argon and a few others stay lit over time. (And if you want the REAL basics, the light is created by electric current passing through, exciting the gas molecules into high-speed collision; when they collide, light is produced.)

The full range of colors seen in neon is produced by three different factors: gas, glass and phosphor coatings. There is the color of the light inside the tube (usually red, blue or pale purple), there is the color of the glass itself (clear, red, blue, green, yellow and orange are common) and there are coatings of powder inside the tube.

The powders act on the principle of phosphorescence -- they convert light of one wavelength (blue) to another, commonly green, turquoise, bright blue, purple and white (various shades of white). In this country powdered tubes are extremely common, and colored-glass tubes much less so, mainly because coated tubes are cheaper and easier to work with. It is when powdered tubes have the neon gas inside that the red shades are produced -- "blue" powder turns pink, "purple" powder turns hot pink, "green" powder turns orange, and the other powders turn similar shades of red and orange.

Most commercial sign shops deal in perhaps a dozen colors of finished tubing, but in fact there are over a hundred colors, many too muted and subtle for signage applications. There are even three gases not commonly used (helium, krypton and zenon) that more than double the number of colors available.

Some of the more unusual colors are a gold resulting from red gas and blue tubing; a deep maroon from a different blue glass and red gas; and a deep orange from a green glass and blue gas. And there are dozens of colors of white, since all use powders to convert blue light to different "temperatures" of light.

Three sizes of glass are commonly used. Measured in diameter they are 10, 12 and 15 millimeter. The smaller the diameter of the glass, the brighter the light is (just the opposite of what you'd think) and the more electricity it takes to light. Narrower tubing also produces more heat and has a shorter life. Commonly, 10mm tubes have a life of 3 to 5 years, whereas 12mm tubes often burn for 10 years or more and 15mm tubes go 15, 20, 30 years... These figures vary; the only thing agreed upon is that larger tubes last longer.

Large tubing is more difficult to work with, and in America it is generally used only for straight lines and sweeping curves. 12mm glass is the most common in sign work, and 10mm is used for intricate work; 8 and 9mm glass are common in beer signs.

3. How to shop for a sign: What is quality neon?

In short, a good sign should feature smooth and accurate bending, unobtrusive welds, consistent color, safe wiring, and long tube life. Things for informed customers to ask here are: How long is the sign guaranteed against tube or transformer failure? What kind of materials and pumping system are used?

But even if they don't know a diffusion pump from a turbomolecular pump, anyone can learn to tell a good sign from a bad sign. Bad signs have mercury stains; they arc and buzz, flicker, have uneven coloring, exposed wiring, bends that look flattened, unnecessary and badly placed welds, sloppy or peeling blockout paint. Look also for poor mounting (transformer too far away, and/or not grounded) and overheating; also for light that seems to "snake" in the tube.

4. Factors in tube life

It's relatively easy to make a sign light up -- it's a lot harder to have it stay lit, year in and year out, still looking good. The problems with neon fall easily into two categories: the tube itself and the high-voltage power supply.

The biggest problem with neon tubes is that they have to be extremely pure inside, especially the tubes that have a drop of mercury in them to produce blue light. Mercury is a highly reactive substance and if there's any trace of impurity in the tube it will form a mercury compound. This has the appearance of ugly black rings or streaks in the tube.

Almost all mercury tubes will get black deposits in them eventually; it's mainly a matter of how long it takes and to what degree. Equipment is allowed to get very old and run-down, and consequently some signs less than one year old have incredibly bad stains in them.

New tubes sometimes will last several days or weeks or months, then suddenly go dead. This is because there will be a microscopic hole, so small that it's impossible to locate. In this case the entire tube must be remade. ♦

Good news, bad news from wide world of neon

*<**Editors' note:** A librarian friend's online search for "neon" yielded these strange tidbits from all over:>*

"Neon signs are a blight on the skyline," *The Straits Times* (Singapore), 1/18/93:

"...These brightly-coloured advertisements will soon become a thing of the past because the authorities are phasing out all free-standing billboards, signs on walls of shophouses and commercial skysigns.

"The reason: To have 'a more pleasant cityscape,' in the words of the Public Works Department (PWD). Although some Singaporeans agree with the move, others feel that this would take the 'soul' and vibrancy out of the country's skyline...

"(The PWD) letter said that the advertisements do not blend well with the surrounding environment, and while they were suitable in the 1950s and 1960s, they now blight Singapore's cityscape.

"A check with two neon companies and a company which does outdoor advertising confirmed that many large advertisements have been dismantled gradually since 1991..."

" 'I smelled Los Angeles before I got to it, it smelled stale and old like a living room that had been closed too long. But the colored lights fooled you. The lights were wonderful. There ought to be a monument to the man who invented neon lights, 15 stories high, solid marble. There's a boy who really made something out of nothing.'

– **Raymond Chandler,** "*The Little Sister*" 1949

(see Neon in the news, page 18)

Pandora's boxes: Tales of broken glass

By Val Crawford

It is a blessing in disguise that neon is difficult to ship – if not for this, small shops in far-flung places (like ours) would have long ago yielded to fewer, bigger companies. Maybe this is happening anyway: some friends who work for production shops say they're working 70-hour weeks doing those fast-food multiples. And others in big cities say neon orders are dropping off as other sign types (vinyl and fake stone, etc.) offer cheaper signs that can exactly duplicate typefaces, trademarks and logos without the trouble of translating designs to neon.

At any rate, more finished neon is being shipped long-distance to shops that are willing to install franchise signs made elsewhere. And for those of us in the boonies, our glass tubing (and everything else) is first shipped to us. We have neon-shipping disaster stories from both categories, and we're sharing them in the hopes that PEOPLE WILL LEARN HOW TO PACK GLASS SOMEDAY!

Classic smash: One customer needed one tube fixed on a sign that was sent to him from elsewhere. We kept ordering four sticks of the correct classic glass, and twice it arrived smashed. We even figured that if it went with a surface order on a pallet it would be safe – wrong! They wrapped the four 5' sticks in a single layer of cardboard and laid them diagonally across the top of everything else (and, apparently, something somewhere between L.A. and Hilo was set upon our pallet – surprise, eh?).

TecnoLux has the best idea, their box within a box. Unfortunately, the only way we can have one of those used is to order bulk, so it's sent directly from New York. Four sticks? Gotta get it pre-smashed.

Express depress: A sign for a fast-food franchise had numerous problems, which we probably could have predicted given the carelessness with which the channel letters were stacked inside a wooden crate without padding, merely styrofoam peanuts, and the paint rubbed off all surfaces that came in contact. The crate, which weighed hundreds of pounds, certainly protected the exterior, but the letters would have been better off with a layer of foam padding around them.

UPS=Usually Pulverizes Silica: We use UPS all the time for other stuff, but glass had better come (and go) Federal Express. Fed Ex doesn't always deliver tinkle-free, but they're great about settlements for broken glass, with breakage up to $100 per parcel paid for without anything but a phone call, more for paperwork filed.

Shipping secrets: One colleague who carried glass tube repairs on interisland flights had a portfolio-sized wooden crate lined on both sides with foam rubber for carry-on. This worked for him, but we find that it isn't padding that helps neon survive jarring: it's being held rigidly to something stronger. We use chicken wire stapled all over 1/4" ply shelves, with each tube wired to the shelf in four to eight places. They shouldn't wiggle or wobble: tighten each wire with several twists of a pliers, and make sure your shelves are held firmly in the crate.

Silicone shafts: Another thing that helps finished letters, especially big ones, survive crating, shipping and uncrating is to silicone straight scraps of clear glass tubing across the letter, like a crossbar. And silicone a tiny glass segment over each tubulation, so that weak point won't be smacked open on anything.

Dunnage delight: We ship a lot of neon by air, so why did it take us four years to learn that our heavy crates can be returned nearly for free as "dunnage," or reusable packaging? We had trained all our customers to pick up the crates at the airport but they had to take them back to the port to take the slow boat back to us, for full price each time. The moral here: if you invest in good crating, you can reuse it for years, so don't cut corners unless you like remaking tubes. (And if you ship crates regularly to distant wholesale customers, check into dunnage.)

Internal affairs: Another company had a record of sending us hundreds of dollars worth of broken glass, and to make a long story (and several nasty faxes) very short – they never learned. No matter how many times we got the salesman to write our packing requirements on the order, the warehouse never read it or otherwise got the message. Such distributors need to learn that their customers, not the low-paid boys in the warehouse, know what the shipment looks like when it gets in, and that maybe orders going further need a little more protection than the one going a mere fifty miles on one truck.

Just when you thought you were safe: So what do we do, most of the time? Keep a huge stock, and try and order everything surface, on pallets. This works great until the day that the distributor is out of the one color you need, and has it trucked in – and THOSE truckers smash it, and you get a smashed box of glass safely stacked on your secure little pallet.

Paper trail: No matter how carefully you work out packing and crating details, if the guy on the forklift is having a bad day you may be out of luck. In such cases: 1) try to insure the shipment in advance (some companies won't insure neon tubes); 2) be sure to check for and note damage immediately, before leaving the shipping dock. Have one of their workers sign your statement – rattling broken glass and wailing "How am I supposed to bend THIS?" usually gets a quick settlement, but it can take months. Keep calling and checking on the progress of your complaint, and make sure the replacement shipment isn't sent in the same (inadequate) packaging. And don't apologize: you ordered usable glass, it was marked FRAGILE, and someone (not you) screwed up. So bitch loudly and with righteous indignation!

Full-dress paint: For best results, make your shipping crates look good, not beat-up, with fresh paint screaming GLASS!!! FRAGILE!!! and all shipping information easily seen on top so the thing doesn't get tipped around to see where it's going. A friend of ours who rents out expensive construction equipment taught us this rule: if it looks like it's been treated carefully, others will treat it with respect too.

Any other neon-shipping stories out there? ♦

(Neon in the news, from page 17)

"Luring lights back to Wilshire: Neon signs once crowned the grand boulevard. Now they stand shabby and forlorn. A fix-up campaign promises to relight some of the glamour." *Los Angeles Times* 6/6/93:

"Car dealer Earle C. Anthony ... gifted the corridor with a flashy crowning glory. In 1922, Anthony returned from Paris with curious souvenirs: two orange-and-blue neon signs. He propped the nation's first neon signs atop his Packard dealership at Wilshire and La Brea.

"...By year's end, the city's Cultural Affairs Department has grand plans to relight more than a dozen of the neon signs that fan out along ... the Wilshire corridor... In a neighborhood choked with crime and overcrowding, and now troubled by drugs and gangs, the plan symbolizes much more than burned-out lights atop faded-glory buildings.

"Adolfo V. Nodal, department general manager and a MacArthur Park area resident, believes the project will not only reinstate pride

(see More news, page 23)

INDEX FOR NEON NEWS ISSUES 1-15:

Ablon, David
– gas transfer system, #13/14 p.2
– assorted tips, #13/14 p.7
Ace Glass Inc. (scientific glassblowing supplies)
– mention, #13/14 p.15
Acton Technologies (mercury clean-up powder)
– supplier column mention, #12 p.12
Actown Tranformers
– #11 p.10
Alcatel
– Catalog review, #11 p.12
Alta-Robbins
– (Robbins valves) #13/14 p.2
Almon Germantrode (electrodes)
– supplier column, #11 p.10
Annealing
– article by Mark Snyder, #7 cover
– anti-stress techniques, #9 p.9
Augusta, Joe
– "Deadly Neon" cliches, #4, cover; (reader responses, #5 p.9)
– last days of Egani neon school, #7 cover
– comment on sheetrock for bending bench surface, #11 back cover
Australian neon
– #7, pg.3

B+C Glastechnische GmbH (torches, glass tools)
– catalog review, #11 p.12
B&B Transformer Co. (powerline bombarders)
– #2 cover; #8 p.3
Baker, Phil
– diffusion pump endorsement, #6 p.11
– query on temp gauge, #6 back cover
– health hazards of phosphor coatings, #7 p.5
Basic electronics
– volts vs. amps, #1 p.7
Beds with neon
– Marj Inman story, #10 p.4
Bending & other tips
– long slow curves, #1 p.2
– working without a pattern screen, #2 p.8
– general tips, #6 p.13, #7 p.2
– cracks on curves, #9 p.3
– block supports, tapered forming block, shortening electrodes, #10 p.5
– talcum powder for GTO, vee blocks for border tubes, transformer holder, "soft grip clamp," color-coding stopcocks, double merc traps, many more, #13/14 p.9
– torch adjustment, dead frames, no more muscle bends, vacuum grease, isolation valves for vacuum pumps & more, #13/14 p.24
Bend Aid Products (custom three-headed torches)
– review, #8 p.9
Bench covering material
– sheetrock, #11 back cover
Bending one-eyed
– Nancy Hammann, #5 p.7
Bertonee (transformers)
– 12-volt transformer review, #12 p.2
"The Best of Neon" by Vilma Barr
– book review, #12 p.10
Bethlehem Apparatus Co. (torches, tools, mercury)
– catalog, #2 p.6
– article on mercury hazards, #5 p.6
Blazek, Michael
– Dutch & Italian neon, #6 p.7
– New Zealand & Australian neon, #7 p.3
– getting conned in Seattle, #11 cover
– pumpstand as racecar, #13/14 p.5
Blockout paint
– Duron brand, supplier mention, #10 p.5
– Handy brush-in-solvent holder, #15 p.2
Blowers
– Gast, Spencer review #2 p.8
– converting from a spa blower, #9 p.5
– building one from an automotive smog pump, #13/14 p.13
Blowhose
– eliminating from manifold, #7 p.6
Blowhose swivel
– two good suppliers, #11 p.10
BNZ Materials, Inc (Maronite, for jig bending)
– supplier column mention, #15 p.11
Bolton, Jerry
– numerous tech tips, pet peeves, #13/14 p.15
Bombarding process & technique
– using a switchable 15kv/30kv bombarder, #8 p.3
– Jeremy Storm on using a small generator as power supply, #8 p.4
– Ed DeZuzio on using a 60mA transformer to bombard small tubes, #8 p.6
– Morgan Crook on helium rinse technique: #8 p.5
– Masonlite on same, #10 p.3
– Ed DeZuzio on bombarding EGL 07 'trodes on 8mm glass, #9 p.9
– Mark Cherveny on bombing classic glass, #10 back cover
– Eric Rothwarf on pre-pumping, #11 p.14
– pumpstand as racecar, #13/14 p.5
– Ed DeZuzio on blanketing tubes, #13/14 p.12
Boonstra, Dick
– on Dutch powdering techniques, #10 p.7
– mixing & milling powders for coating, #11 p.3
– tips, #11 p.4
– manifold leak-tester, #11 p.5
– glass & metal manifolds, #13/14 p.10
– Magdenburg half-spheres (history of vacuum science), #15 p.12
Books
– "Neon Principles: The Art of Shaping Light with Neon" by Randall Caba, review #13/14 p.4
– "Neon ABC: Alphabets by Dean Blazek" review, #3 p.8
– "The Laboratory Handbook of Materials, Equipment & Technique," #12 p.12
– "The Light Artist Anthology" by Christian Schiess, review #13/14 p.18
– neon pricing book, review by Joseph Keller, #10 p.6
– "The Best of Neon" by Vilma Barr, review #12 p.10
– "Creative Glassblowing, Scientific & Ornamental" by Hammesfahr & Strong, #2 p.6
Books Nippan
– catalog review #6 p.9
Brown, Jimmy
– neon in France, #12 cover

Cajon Company ("ultra-torr" high-vacuum fittings)
– #13/14 p.2.
Canadian Scientific Glassblowing (diffusion pumps)
– supply column mention, #11 p.12
Carlisle Machine Works (torches)
– catalog #2 p.6
– air pressure gauge #3 p.9
– supplier column mention #9 p.14
Chemglass
– catalog mention, #8 p.9
Cherveny, Mark
– comments on diffusion pumps, pumping classic glass, #10 back cover
– old illustrations, #13-14
– comments on manometer bubbling, electrode side-discharge, o-ring connectors leaking, blockout brush holder, "Zeon" committee, more, #15 p.2.
Chokes
– Chokemaster, #2 p.4
– general description of electronic chokes, #2 p.5
– idea for home-made electronic choke, #3 p.9
– home-made saltwater choke, #6 p.2
– building a ratchet for sliding choke control, #7 p.7
– comments on saltwater choke, #8 p.9
– building an electronic choke, #11 p.6
– criticism/defense of running electronic choke article, #12 p.12
– addendum to electronic choke article, #12 back cover
– use a welder as a bombarder choke, #15 p.16
"Chokemaster" (electronic choke)
– #2, p.4
"Citrinox" (oil remover)
– #13/14 p.15
Classic glass <see also "ruby red">
– Audie's column: #3, p.11
– Mark Cherveny comments on pumping, #10 back cover
– comments on Tecnolux & EGL, #11 p.10
Clocks with neon
– sources, #2 back cover
Cold-cathode
– David Ablon on technique, #13/14 p.7
Cole-Parmer Instrument Co.
– catalog mention, #11 p.10
Color chart
– building with many variables, #3 cover
– building a "hot" color-sample case, #8 p.6
Condomatic
– blowhose safe sucks, #10 p.3
Contracts
– nightmare legal clauses, #13/14 p.25
Cortese, Frank Sr.
– anecdote about lethal bombarder incident, #1 p.7
– diffusion pump comments #3 p.3
Crawford, Val
– theft of the name "neon", #4 p.10
– theater restoration, #6 p.5
– EMF health hazards, #7 p.4
– Asian neon, #12 p.7
– "The Best of Neon" book review, #12 p.10
– legal nightmares, #13/14 p.6
– "The Light Artist Anthology" book review, #13/14 p.18
Crook, Morgan
– stress reduction in curves, #2 p.8
– Masonlite machine-drawn glass, #2 p.8
– Precision Neon Products catalog, #3 p.9
– query on source for single-ended drivers & RF units, #3 p.9
– Masonlite helium rinse technique, #8 p.5
Cruikshank, Rob
– drawing, #15 p.3

Daco Neon Equipment
– supplier column mention, #11 p.10
David, Peter
– single-electrode tubes & oven pumping, #6 cover

(continued next page)

(Index, from previous page)

– saltwater choke, #6 p.2
– high-frequency transformer principles, #8 p.7
Davidson, Len
– restoration guidelines, #6 p.4
Dead frame technique
– #13/14 p.24
Dellinger, John
– rsearch on solid-state bombarding transformers, #8 cover
Dezort, Daniel
– California Highway Patrol on 12-volt neon, #4 back cover & #9 back cover
DeZuzio, Edward
– using a 60mA transformer to bombard small tubes, #8 p.6
– building a "hot" color-sample case, #8 p.6
– making & bombarding 8mm short tubes for a 1/12 scale mock-up, #9 p.9
– love/hate affairs with traps & manifolds, #9 p.12
– selling neon in a recession, #10 p.10
– reprint of 1956 "Comet Glass Laboratories" invoice, #10 p.10
– photographing neon, #10 p.8
– dumpster diving, designs, #11 p.11
– Paris Neon school memories, #12 p.5
– rope & darts to lay out ceiling neon, #12 back cover
– Dutch neon comments & tricks, #13/14 p.12
– post-coated lead glass, Sign Europe 1993 report, tight serif work, #15 p.14
– interview with Gerard Lewa, #15 p.15
Diffusion pumps
– Renay Murray, blowup, #3 p.2
– Mark Snyder: differences between aspirator & diffusion pump, #3 p.3; need for a secondary pump, #4 p.4; compared with turbo pumps, #13/14 p.17
– Peter Mason: comparing to turbo pumps, #5 p.5
– Phil Baker: before & after, #6 p.11; description of using Masonlite pump stands, #7 p.3
– Joseph Keller, to diffuse or not, #10 p.6; hooking up a large metal one, #10 back cover
– Mark Cherveny comments, #10 back cover
– two suppliers, #11 p.12
Directory of neon folks
– Sign up, #15 back cover
Dorr, Telford
– building an air source (blower plus regulator) with a spa blower & PVC pipe, #9 p.5; building a high-frequency transformer, #15 p.6; punching in the numbers on manifold conductance, #15 p.7; cheapest ever bombarder, #15 p.16; using a welding maching for a bombarder choke, #15 p.16
Dover Publications
– design catalog review, #6 p.9
Dr. Argon
– "Have you ever...?" column, #11 p.9
– numerous tech tips, #13/14 p.9
– Sir Jerome vs. the pattern monster, #15 p.4
Duniway Stockroom Corp.
– catalog review, #9 p.14; mention, #13/14 p.2, p.17
Dupont paints
– for sign restoration, #9 p.14
Dutch neon
– Michael Blazek article, #6 p.7
– Ted's impressions #9 cover, #10 p.2
– article on differences with lead-glass neon. #9 p.7
– Dick Boonstra article on powdering techniques, #10 p.7
– mixing & milling powders for coating. #11 p.3
– Ed DeZuzio tricks & comments, #13/14 p.12
– Ed DeZuzio on various techniques, #15 p.14
– interview with Gerard Lewa, #15 p.15
Dwyer Instruments (manometer)
– supplier column, #7 p.11

Ed Mar Crystal & Jewelry Co. (files, torches, misc.)
– supply column, #10 p.9
Egani
– neon school's last days, #7 cover
EGL
– supplying small quantities of glass, #6 p.12
Egyptian neon
– #12 p.7
Eliot, Fred
– comment on powerline transformers, #2 p.4
Electromagnetic field (EMF) health hazards
– #7, p.4
Electrodes
– Eurocom jingle-bells, #8 p.11
– shortening 'trodes, #10 p.5
– Almon Germantrodes, #11 p.10
– side discharge, #15 p.2
Elettrotecnica Per Luce (transformers)
– 12-volt transformer review, #12 p.2
Erixsen, Brian
<see "Dr. Argon">
Eurocom Imports
– milliamp gauge, #2 p.5
Explaining your profession
– Ed DeZuzio, #7 back cover

Felde, K. (Leybold)
– defending turbomolecular pumps, #13/14 p.14
FBI #1 Most Wanted Tubebender
– #3 p.5
Fisher Scientific
– catalog in supplier column, #7 p.11
– "Citrinox" oil remover, #13/14 p.15
Fling, Tom
– bombarder "fixed choke", #2, p.5
– comments on mechanical pump ultimate vacuum, #3 p.3
– arguing for shorter tubes to increase quality, #9 p.15
Foote, Audie
– employer of criminals, #3 p.5; neon & the supernatural, #1 p.9; classic glass, #3 p.11; installers get the last word, #4 p.11; Leon's school of neon. #5 p.11; this butt's for you, #5 p.11; shipping neon, #6 p.15; bidding process, #7 p.9; customers, #8 p.11; jingle-bell electrodes, #8 p.11; dead rats & buzzing hearing aids, #9 p.15; ten-year anniversary memories of neon school, #10 p.11; rooftop shenanigans, #10 p.11; contracting neon "art," #11 p.15; world's worst bender, #12 p.11; paranoia run rampant, #13/14 p.21; Neon Academy awards, #15 p13
Footpedal
– torch control, #1 p.3
French neon
– #12 cover
Fusion magazine
– supplier column, #10 p.9

Galleries (neon)
– Jay Blazek Western Neon, mention on #10 back cover
– Amuze gallery. #13/14 p.26
– the Glass Studio, #2 p.3
– Pumpkin Centre Gallery. #2 p.3
Gas (see also "rare gases")
– pressure control for torches, #3 p.9
– source for good pressure regulators, #10 p.9
Gauges
– capsule dial gauges, #9 p.13
Geisler tubes
– #1 p.8
Glass magazine
– supplier column, #10 p.9
Glass Line magazine
– supplier column, #10 p.9
Glass markers
– permanent paint type, #11 p.10
– Berol china markers, others, #12 p.9
Grow lights
– make your own, #11 p.4

Hage Connectors (springs for glass housings)
– mention, #13/14 p.26
Hampl, Patricia
– elegy for lost "SCHMIDT" sign, #5 p.8
Hannmann, Nancy
– testifying over a wiring fire, #4 p.3
– repairs, #4 back cover
– trying to bend one-eyed, #5 p.7
– interviewing Billie Lawless' neon fabricator, #7 p.8
– looking back at self-employment, #13/14 cover
– "Have you ever...?" #13/14 p.11
Havey, Maureen
– interview on teaching artists about neon, #15 cover
Have you ever...
– Dr. Argon, #11 p.9
– Nancy Hammann, Ted Pirsig, #13/14 p.11.
Health concerns
– bombarder incidents, #1 p.7, #8 p.10, #9 p.3
– mercury, #5 p.6; #7 p.11
– electromagnetic fields, #7 p.4; #8 p.4
– phosphor coatings, #7 p.5
– burning your fingers, #7 p.10
– carpel tunnel syndrome, #9 p.3
– "condomatic" blowhose device, #10 p.3
– explosion, #10 p.8
– working in heat, #11 p.7
– ventilation, #13/14 p.7
Helium
– rinse technique, #8 p.5, #10 p.3
– tubes, #13/14 p.14
Herbert Arnold GmbH & Co. (European torches)
– catalog review, #11 p.12
High-vacuum suppliers
– Varian Vacuum Products, #6 p.9
– Metra Inc. High Vacuum Equipment, #6 p.9
– Fisher Scientific, #7 p.11
– Leybold Vacuum Products, #7 p.11
– Chemglass, #8 p.9
– Duniway Stockroom Corp., #9 p.14, #13/14 p.2
– Cole-Parmer Instrument Co., #11 p.10
– Alcatel, #11 p.12
– Canadian Scientific Glassblowing, #11 p.12
– Alta-Robbins, #13/14 p.2
– Cajon Company, #13/14 p.2
– Kinney Vacuum Co., #13/14 p.24
– Boekel/Hyvac, #13/14 p.24
– Capitol Vacuum, #13/14 p.20
– H.T. Vacuums. #13/14 p.20
History (old components)
– query on Thordarson, Sola. Supra, #12 p.13
– info on artwork from old catalogs, #13/14 p.19

(continued next page)

(Index, from previous page)

– call for sign restoration book, #13/14 p.8
Hong Kong neon
– #12 p.7
Hot line (people to call with technical queries)
– Richard Jenkins, #5 p.10
– Phil Baker, #6 p.12
– Joseph Keller, #10 p.6
– Jerry Bolton, #13/14 p.15
Hot wire glass cutter
– building your own, #6 p.13
– Kitco, #13/14 p.17
HPS (vacuum products)
– pirani gauge, #2 p.5
– catalog review, #2 p.7
– backfill with pirani gauge, #4 p.2
Houde Glass
– supplier column mention, #9 p.14

Ilmenauer Glasmaschinenbau GmbH (European torches)
– catalog review, #11 p.12
Information Unlimited / Scientific Systems (high-tension devices)
– catalog mention, #4 p.9
– one-electrode power sources #9 p.14
– 12-volt transformer review, #12 p.2
Inman, Marge
– customers who reappear after long absence/neon bed, #10 p.4
Interference (electronic)
– TV remote controls vs. electronic transformers, #7 p.8
– motel neon job with mysterious interference, #9 p.10; Bob Lind response, #10 back cover
– Martin Anderson, #13/14 p.26
Invac Industrial Inc. (pump fluids)
– supplier column mention, #15 p.11
Italian neon
– Michael Blazek, #6 p.7

J & P (torches)
– catalog mention, #2 p.6
Jenkins, Richard
– Hollywood job from hell (chicken wire), #2 p.5; comments on color charts, #3 cover; new ideas, #3 p.7; second Hollywood job from hell (bursting incandescent bulbs)/call for "hot line," #5 p.3; loading solid-state transformers with full amount of GTO, #5 p.5; response to Joe Augusta, #5 p.9; review of pattern-making tools, #6 p.12
Jobs from hell
– novice bender, #1 cover
– Richard Jenkins, #2 p.5 & #5 p.3
– fun in a boom truck, #6 cover
– Nancy Hannmann on self-employment, #13/14 cover

Kanter, Larry
– "Select-O-Former" (quick set-up for transformer load-testing), #4 p.8
Keller, Joseph
– query on making crackle tubes, #6 back cover; working for a family-owned
sign company (old equipment vs. new), story of bombarder injury, #8 p.10; electronic transformers, pricing book & diffusion pumps, #10 p.5; working in heat; selling; setting up a Jacob's ladder display, #11 p.7; making holiday trinkets from scrap glass, #12 back cover

King, Candice
– bending tips; bombarder injury; carpel tunnel syndrome warning, #9 p.3; more bending tips, #10 p.5 & #12 p.9; removing mercury with hot water, #11 p.14; ornamental glass techniques (part 1), #15 p.5; warnings about working abroad, #15 p.8; comments on sharing bending tricks, #15 p.9
Kitco (hot wire glass cutter)
– supplier column mention, #13/14 p.17
Kites with neon
– #5 cover
Krom/Schroder (gas pressure regulators)
– supplier column, #10 p.9
"Krytox" (high vacuum grease)
– #13/14 p.24

Lab apparatus companies (see Scientific glass/lab supply companies)
Lab Safety Supply
– catalog review, #7 p.11, #12 p.12
"The Laboratory Handbook of Materials, Equipment & Technique"
– supplier column, #12 p.12
Lawless, Billy
– reprints of news stories detailing controversial sculptures, #6 p.3
– Nancy Hannmann interviewing his neon fabricator, #7 p.8
– 1993 update from N.Y. Daily News, #15 p.12
Leak-tester for manifold
– #11 p.5
Legal issues
– contract clauses to watch out for, #13/14 p.25
Leybold Vacuum Products (high-vacuum equipment)
– supplier column, #7 p.11
– defending turbo pumps, #13/14 p.14
"The Light Artist Anthology" by Christian Schiess
– book review, #13/14 p.18
Lightning Line Neon (electrode holders)
– supplier review, #8 p.9
Lind, Bob
– eliminating the need for a manifold blowhose, #7 p.6; standardizing colors, eliminating 15kv transformers, #2 p.8; using oak strips instead of metal screen over the pattern, #9 p.9; response to interference problem, #10 back cover; helium tube comments & more, #13/14 p.13
Lindsay's Electrical Books
– Catalog review, #5 p.4

MacRae, Scott
– cartoons, #15 p.4
Manometer
– bubbling, #15 p.2
Map wheels
– supplier column, #11 p.12
Markers for glass
– permanent-type, #11 p.10
– Berol china markers, others, #12 p.9
– Pilot and Mita brand, #15 p.11
Mason, Peter
– pump oil & diffusion pumps, #5 p.5
Masonlite
– bombarding transformer, #2 p.4
– backfill gauge, #2 p.5
– machine-drawn glass, #2 p.8
– helium rinse technique, #8 p.5, #10 p.3
– comments on capsule dial gauges, #9 p.13
Max Marketing (distributor)
– #5 p.5

Mercury <see also "Staining">
– hazards (Bethlehem), #5 p.6, #7 p.11, #9 p.3
– migration, #6 back cover
– eliminating manifold blowhose, #7 p.6
– removing mercury from tubes with hot water, #11 p.14, #12 p.12
– in manifold, #12 p.9
– spill control & detection equipment, #12 p.12
– jar-plus-foam collector, #13/14 back cover
– drain trap for washed-down mercury, #13/14 p.26
– horror story, #13/14 p.15
Metal manifolds (see also "High-vacuum components")
– Dick Boonstra article, #13/14 p.10
– preheating before use, #12 back cover
Metra Inc. High Vacuum Equipment
– catalog review, #6 p.9
Meyer, Chris
– building a ratchet control for sliding choke, #7 p.7
Meyer, Pat
– bending without a screen/light table for pattern transfer, #2 p.8
Milliampmeters
– Simpson model for bombarding, #5 p.5
Murray, Renay
– diffusion pump blowup, #3 p.2; hot fingers, #7 p.10; Universal Studios job, #8 cover

New Zealand neon
– #7 p.3
"Neon ABC: Alphabets by Dean Blazek"
– review, #3 p.8
Neon Dynamics (transformers)
– Peter David, #8 p.7
– response to "adjusting screw" complaints, #11 p.12
"Neon Principles" by Randall Caba
– review, #13/14 p.4
Neonix (transformers)
– Bulletin Board, #12 back cover

Ornamental glass
– making "icicles," #12 back cover
– tools & setup, #15 p.5
Oven pumping
– building a small oven, #6 cover
Oxygen
– adding to torches, #1 p.3; #3 p.6; using German footpedals, #11 p.12

Pattern-making tools
– review of "Quick & Easy" templates, #6 p.12
Pellegrino, Trudy
– cartoons, #5 p.8 & #8 p.10
Phillips suspension system (see "Dutch neon")
Phosphors
– health hazards, #7 p.5
– Dutch tube-coating techniques, #10 p.7
– mixing & milling powders for coating, #11 p.3
Photographing neon
– #10 p.8, #13/14 back cover
Pirani guages
– cautions, #2 p.7
– questioning "backfill" abilities, #4 p.2
– Phil Baker, #6 p.11
Pirsig, Ted
– torch footpedals, #1 p.3 & #3 p. 6; bending slow curves, #1 p.2; basic electronics, #1 p.7; powerline transformers for bombarding, #2 cover; color-chart, #3 cover; salt-water choke, #6 p.2; bending tips, #6

(continued next page)

(Index, from previous page)

p.13, #7 p.2; doubling bombarder output, #8 p.3; Dutch neon, #9 cover, #9 p.7, #10 p.2, #11 p.4; manifold fore-trap, #10 p.3; mixing & milling powders, #11 p.3; Jimmy Brown, #12 cover; 12-volt transformer testing, #12 p.2; defending "hazardous" articles, #12 p.12; "Neon Principles" book review, #13/14 p.4; "Have you ever...?" #13/14 p.11

Piver, Jim
– neon lyrics, #9 p.13
– self-contained torch bench, supplier column mention #15 p.11

Pope Scientific Inc. (scientific glassworking materials)
– suppliers column, #12 p.12

Powerline transformers for bombarding (see "Transformers, bombarding")

Precision Neon Laboratories
– catalog, #3 p.9; video catalog review, #8 p.9 (also see "Snyder, Mark")

Pricing book (review)
– Joseph Keller, #10 p.6

Pro Mech Engineering (torches)
– suppliers column, #8 p.9

Quality issues
– Jerry Bolton on pumping stations, #13/14 p.15

Rare gases
– mixing neon & argon, #3 p.4
– mixture turning color, #13/14 p.26
– Edwards gas flask connector, #10 p.9
– gas transfer system, #13/14 p.2
– helium, #13/14 p.13
– backfilling pressure, #13/14 p.26
– fill pressures for short tubes, #15 p.4

Rasmussen, Craig
– transformer interference with TV, #7 p.8

Root Equipment (electric junkyard)
– #11 p.6

Rothwarf, Eric
– #10 p.8, #11 p. 14

Run-Mate Instruments (map wheels)
– suppliers, #11 p.12

Rubber mats
– #11 p.14.

Ruby red
– pumping problems/solutions, #2 p.9
– Audie, #3 p.11;
– five-times-bombard technique, #11 p.14
– NESA seminar transcript; ammonia technique, #13/14 p.2
– "blanket" technique, #13/14 p.27
– 1954 Signs of the Times article, #15 p.3
– Chemical analysis, #15 p.3
– vacuum ammonia injection technique, #15 p.3

Safety two-hand switch
– for bombarding, #2 p.5

Saturable iron core reactors (see "Chokes")

Scale models in neon
– Edward DeZuzio, #9 p.9

Scam artist (selling neon)
– #11 cover

Scientific glass/lab supply houses
– Fisher Scientific, #7 p.11
– Ace Glass Inc., #13/14 p.15
– Canadian Scientific Glassblowing, #11 p.12
– Chemglass, #8 p.9
– Lab Safety Supply, #7 p.11
– Cole-Parmer Instrument Co., #11 p.10
– Pope Scientific Inc., #12 p.12
– TRS Scientific Glass, #11 p.12

Schleissner, Jed
– "Condomatic" blowhose device, #10 p.3

Schmidt, Terry
– blower from automotive smog pump, #13/14 p.13

Schools (neon)
– Egani's last days, #7 cover
– criteria for, #9 p.2
– Audie's memories of, #10 p.11
– Randall Caba, #10 back cover
– accreditation process, #11 p.2
– Ed DeZuzio on Paris Neon, #12 p.5
– National Neon Institute, #13/14 p.26

Sebesta, David (illustrations)
– #8 front cover
– #13/14 front cover, p.5, p.11, p.21
– #15 p.13

Silicone
– tubulation protection & glass pads, #11 p.14
– protecting pattern-screen edges & tube-support anti-spin devices, #12 p.9
– grommets, #13/14 p.7

Simpson Electric Co. (meters)
– #5 p.5

Single-electrode tubes
– making & pumping, #6 cover

Smith, Neil
– legal nightmares in signage, #13/14 p.6 & p.25.

Snyder, Mark
– aspirator & diffusion pumps, #3 p.3
– need for a secondary high-vacuum pump, #4 p.4
– high-vacuum glossary, #4 p.7
– annealing, #7 cover
– mercury repairs, #7 p.11
– temperature crayons, tube staining, #7 back cover
– vs. Transco, #10 p.9, #11 p.13
– turbo & diffusion pumps, #13/14 p.16

Society for Commercial Archeology
– #7 p. 11

Solenoid valves
– torch control, #1 p.3 & #11, back cover
– controlling gas ballast on forepump, #11 p.4
– ribbon control, #11 back cover
– pump venting, #13/14 p.24

Spectra Gases (gas; transfer systems)
– #13/14 p.2, p.17

Staining
– query & solutions, #6 back cover
– eliminate calcium tungstate, #7 back cover
– stain-related lawsuit, #8 p.5
– Voltarc article, #10 cover
– Becky Schuchert, #11 p.14
– Eric Rothwarf, #11 p.14

Standard Neo-Lite (glass housings)
– #13/14 p.26

Steele, Charles
– catalog, #4 p.2
– tube supports, #9 p.14

Steinberg, Susan
– exotic glass, #5 p.4

Storm, Jeremy
– bombarding with small generator, #8 p.4
– building a magnetic field meter, #8 p.4
– "anti-gravity" plasma tubes & crackle lamps, #9 p.11
– hooking up a large metal diffusion pump, #10 back cover
– manifold leak-tester, #11 p.5
– building an electronic choke, #11 p.6

Stress cracks
– ultra-blue, #1 p.5, #2 p.9
– on curves, #2 p.8

Stripping powder from tubes
– #12 p.9

Suppliers
– **#2:** Carlisle Machine Works; Bethlehem Apparatus; Wale Apparatus; Robbins Valve; J & P; Grainger; Hawaii Valve & Fitting; Precision Scientific Group; HPS
– **#3:** KEY High Vacuum Products; Edwards USA Vacuum
– **#5:** Lindsay's Electrical Books; Tech 2000; Max Marketing; Simpson Electric Co.
– **#6:** Varian Vacuum Products; Metra; ISW; Books Nippan; Dover Publications; 21st Century Neon Works; West Coast Custom Designs
– **#7:** Lab Safety Supply; Teledyne Hastings; Dwyer Instruments; Fisher Scientific; Leybold Vacuum Products; Precision Neon Laboratories
– **#8:** Tecnolux; Switchco; Pro Mech Engineering; Lightning Line Neon; Bend Aid Products; Chemglass; Walbridge
– **#9:** Duniway Stockroom; Houde Glass; Carlisle Machine Works; Information Unlimited; Charles Steele; Dupont
– **#10:** Ed Mar Crystal & Jewelry; Krom/Schroder; Bertonee; Glass Line magazine; Fusion magazine
– **#11:** Herbert Arnold; Ilmenauer Glasmaschinenbau; B + C Glastechnische; Alcatel; Run-Mate Instruments; Root Equipment; Sylvania Phosphors & Chemicals; Raffi & Swanson; Daco Neon Equipment; Wale Apparatus; Almon Germantrode; Cole-Parmer Instrument; Omron; Actown; TRS Scientific Glass; Canadian Scientific Glassblowing
– **#12:** Lab Safety Supply; Acton Technologies; Pope Scientific
– **#13/14:** Tordiff Tool; Voltarc; Kitco; Spectra Gas; Alta-Robbins; Cajon; Duniway Stockroom; Victory Neon Equipment
– **#15:** Invac Industrial Inc.; Neostix; BNZ materials; Jim Piver; B&D syringes

Swormstedt, Tod
– old companies & ads, #13/14 p.19

Switchco (transformer wholesaler)
– #8 p.9

Syringes
– B&D brand, Monoject brand, #15 p.11.

Taiwan neon
– #12 p.8

Tech 2000 (transformers)
– #5 p.4
– on kites, #5 p.8
– Peter David, #8 p.7
– testing of, #12 p.2

Teledyne Hastings/Raydist
– #7 p.11
– #13/14, p.15

Temperature sensors
– thermal crayons, #7 back cover

Thai neon
– #12 p.7

Theater restoration
– #6 p.4-5

Thompson, Matt
– illustrations, #1 p.11; #2 p.5; #3 p.11; #10 p.4, 5; #11 cover, p.4, 8, 9, 11; query on stress-cracking, #1

(continued next page)

(Index, from previous page)

p.5; kites with neon, #5 cover
Tokarski, Tom
– Query for help with a t.v. interference problem, #9 p.10
Torches
– footpedals, oxygen, #1 p.3; #3 p.6
– adjusting Hyde economizers, #10 p.13, #11 back cover
– ribbon footswitch, #11 back cover
–adjustment to reduce heat on hands, #13/14 p.24
Torditff Tool Co. (swivels, electrode holders)
– #13/14 p.17
– correction, #15 p.11
Transco
– bombarding transformer, #2 p.4
– capsule dial gauges, #9 p.13
– vs. Mark Snyder, #10 p.9, #11 p.13
Transformer loading
– milliamps for various tube sizes, #8 p.6
– "Select-o-former," #4 p.8
Transformers, 12-volt
– schematic for ignition-coil version, #1 p.6
– review of 12-volt transformers, #12 p.2
Transformers, bombarding
– powerline models, #2 cover, #3 p.9, #15 p.16
– John Dellinger solid-state type, #8 cover
– setting up a 15kv/30kv switchable bombarder, #8 p.3
– getting zapped by one, #1 p.7, #8 p.10, #9 p.3
Transformers, core & coil
– milliamp load testing setup, #4 p.8
Transformer faders
– Bertonee, Tech 2000, Neon Dynamics, Magnatek supplier column mention, #15 p.11
Transformers
– freestanding base, #6 p.12
Transformers, solid-state
– plasma ball-type power supplies, #4 p.9
– loading with full amount of GTO, #5 p.5
– Peter David, #8 p.7
– Joseph Keller, #10 p.6
– Neon Dynamics, #11 p.13
– Debra Lee Rose on Neonix, #12 back cover
– build your own, #15 p.6
Transfotec International (transformers)
– 12-volt transformer review, #12 p.2
Traps
– manifold foretrap, #10 p.3
TRS Scientific Glass (diffusion pumps)
– #11 p.12
Tube testers
– portable, #2 p.2
Tunewell (transformers)
– 12-volt transformer review, #12 p.2
Turbomolecular pumps
– Peter Mason, #5 p.5
– Dick Boonstra, #12 p.13
– Leybold defense, #13/14 p.14
– Mark Snyder, #13/14 p.16

Unitex SPG (extruded neon fixtures)
– Supplier column mention, #15 p.11
Unusual shop names
– #5, p.2

Varian Vacuum Products
– #6 p.9
Victory Neon Equipment (electronic choke)
– #13/14 p.17
Visual Electronics (portable tube testers)
– #2 p.2
Voltarc
– tipping torch, #13/14 p.17
Voltmeter
– #9 p.6

Walbridge Corp. (porcelain enameling)
– #8 p.9
– torches, #2 p.6
– blowhose swivels, #11 p.10
– book, #12 p.12
Wiring fire
– #4 p.3
Women in the workplace
– #12 p.3
Working abroad
– things to watch out for, #15 p.8
Young, Gayle
– Accreditation process for neon schools, #11 p.2.
Zeon committee
– #15 p.4

(More news, from page 18)

in Los Angeles' glamorous past, but is also a reverent way to dramatically herald what is yet to come... 'Not that new neon,' he stresses, 'but that old, really great neon. You know what I mean? ...It's very hard for people to visualize. They just think it's a bunch of old signs on top of a bunch of old buildings. They don't see the magic until it really happens.'

"The once-slick hotel community he has designs on will cost an estimated $250,000 to relight. He hopes the bulk of the funds to replace broken tubes, transformers and sign supports will come from local businesses and area residents...

"With $75,000 raised thus far, and the relighting set for New Year's Eve, Nodal and staff are looking for gifts from foundations as well as rallying support around an 'adopt-a-sign' program. Though Department of Water and Power personnel began climbing on roofs to assess the signs in mid-May, Nodal admits it will be difficult to rustle up the money.

" 'We hope to change the attitudes about L.A. being a terrible, horrible ugly place,' (one staff member said)..."

(*Kenny Greenberg of Krypton Neon on Long Island NY*) "remembers with awe a sign from his teen years that stood atop a barbecued-chicken restaurant. 'They had a chicken that would walk across the roof and voluntarily jump into the flames and turn into a cooked chicken. It's disturbing – it's almost disturbed – and yet it's a parable of sorts. It says something very primitive about life. And the chicken would always do it. Then one day the broiler part of the sign broke, so the chicken would... stop and start over again. I said, "Ah. It got smart." ' " (*Newsday* 12/22/92) ♦

(Bull, from page 24)

Comments from Mark Cherveny:

On Ted's query for safety devices for transformers: "The only two reputable safety devices I know of are:

"1) The Jefferson 700-series Smart Companion. This is a separate control box that is wired to any conventional transformer, protecting against open circuit, short circuit, arcing and overheating.

"2) The other option is Allanson's Unitran Protector, which is a conventional transformer with control prewired. It protects against open, short, arc and improper ground protection."

"I talked to University Microfilms International (800-521-3044) to see if they have any old Signs of the Times **microfilmed.** They said that they stopped at 1975 but would consider doing older ones if they got ten or more requests for them.

"I have put in for '31-'33, '47-'57 particularly 1954, 55. If anybody else was serious about getting a film I believe they would be about $60-$90 per year set.

"I believe it would be a poor choice to use Telford Dorr's 'Cheaper yet' **bombarder** for a 'professional' neon shop. It would be OK for a neon putz-a-rounder but for sign shop use anything less than 7 KVA won't properly heat long 15mm tubes and electrodes.

As you mentioned in NN #8 on 30KV transformers, the ability to strike the arc at the beginning of the heating cycle is determined by the voltage, but the current (heating capacity) is limited by the KVA rating.

In this case a long tube won't get the 500mA needed to fully heat the electrodes, it may only get 300 Ma. Because of this lack of current it will be a problem double-pumping effectively.

When compared to the vacuum pumps a good "professional" bombarder is a small investment that will last the lifetime of the business.

I am still using a Sola 7KVA unit from 1947 with sliding choke. For most neon units it works fine but on long units it would be faster/easier if I had a 10 or 15KVA unit.

From what I hear most shops replace their bombarders because they are too small rather than burning them out.

"Despite my concern I would rather see that published than return to the attitude of 'trade secrecy.'" ♦

BULLETIN BOARD

Josephine Jones of J&J Signs, Colorado Springs CO notes that now that they've expanded into neon (after 14 years of hand-lettering) she finds it "a medium fraught with unseen and unanticipated perils. Electrical devices and lettering enamel are two very different animals... If there was any one burning question I would like to have answered, it's 'How the holy H_ll do you install this stuff so that it's SAFE?' I'm a sole proprietor so my butt's on the line. There are lots of electricians who don't know how to work with neon. There are also quite a few who say they can but have no clue. Any way to have people address this issue in The Neon News on a regular basis? <Editors' note: We do want to run more stories on installations, starting with Ted's this issue, and hopefully a tide of readers' install stories in the next issue.>

Don Anderson, Aloha OR, is looking for a source for "reliable and low-cost **non-glass vacuum valves**."

Sears Shop at Home Service is finally taking on the big issues, with an "as seen on TV" pair of "no more nighttime jitters" **Night Driver Glasses**. Among other things, they'll help you "eliminate glare from blinking neon signs."

Len Davidson of Phila. PA suggested: "How about getting a "Be on the Lookout" column for **classic neon signs**? Let's publicize our interest in neon spectaculars, classics, animated pieces, porcelain enamel extravaganzas, etc. Then people can write in to list their favorites (with locations and descriptions and crazed raps hopefully). We then compile the list and each issue have a column describing the great signs in these United States...

Don Paquin, San Jose CA, writes "Got any good **stopcock jokes**? Neither do I!"

In response to Glenn Karich's comment on the Transco Revised Luminous Tube **Footage Chart**, Henry Brown called to point out that the high-footage figures were for 120-mA transformers.

EGL has hired **Paul Charlton**, formerly of Masonlite and the British School of Neon, for the newly created "Manager of Technical Support and Glass Fabrication" position. So he's the guy to call with questions.

EGL has also introduced two new colors, "violet" and "clear bright yellow" (a double-coat color); free samples can be obtained by calling them at (201) 824-2200.

Regarding pumping problems, both **Dirk Boonstra** and **Alan Geoffrey** spoke strongly in favor of what can be alleviated by oven-baking prior to pumping.

In Alan's case, he said he was doing a series identical signs with precoated lead glass. Before putting the electrodes on he'd oven-pump them (such things come easy when you're running a neon biz in the Netherlands, as you're already doing it with most of your work anyway) and he had no problem with staining until he had to rush one portion of the order through, skipping the baking.

Dirk writes: "Regarding the 'Are we red yet?' article, I am still surprised that nobody is talking about an oven. It is the oven that is cleaning the tubing and making it pure before pumping. You can double your pumping speed, your glass will be three times stronger, completely hydrogen-free, cleaner, with better light output and with less staining when you bake it in an annealing over at 450° C. Several times I read about these problems and nobody is mentioning an oven.

"I would like to say 'try to make quality, use an oven.' The fluorescent layer will be sintered to the glass wall again even in the bends, so there is no free space between the layer and the glass wall, which is the principal cause of stains. Otherwise mercury can be trapped between the layer and the glass wall, reducing the glass temperature, and there it is a stain. More and more mercury will condense at that point."

<Turns out that Dick Boonstra's real name is Dirk (there's a lot of this in Dutch-to-English translation, such as Jan becoming John); he's now decided to go with Dirk on his byline.>

(see Bull, page 23)

ADS

Colorful neon postcards: Pontiac Indian, Hojo's lamplighter, Buster Brown, etc. 17 assorted, $9.50; 50 cards, $13.50. Davidson, 860 N. 26th St., Philadelphia PA 19130; (215) 232-0478.

Benders wanted (no pumping), production bending shop near Wisconsin Dells. Piecework, larger channel letters, excellent pay. Write C/O Neon News.

NEON NEWS T-SHIRTS: Many colors available; white ones have hand-colored letters for a neon look. $10 each in large, extra-large and kid sizes.

German glass shop seeks experienced lead-glass bender, knowledge of German helpful. Fax Mr. Werner Bohm, (49) 3677-840250

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